The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Chicago, July 26, 1924 FOUNDED 1902 Volume XXVII, No. 15

MEMBER AUDIT BUREAU OF CIRCULATIONS PUBLISHED BY THE TRADEPRESS PUBLISHING CORPORATION, INC. MEMBER ASSOCIATED BUSINESS PAPERS

ISSUED EVERY OTHER WEEK—NEXT ISSUE WILL BE AUGUST 9

Rock Products

Volume XXVII | Chicago, July 26, 1924 | Number 15

Modern Slag Plant Built in Record Time

Keystone Slag Company, Reading, Pennsylvania, Replaces Wood Structure with All-Steel and Concrete in Four Months — A Good Example of the Progress of the Rock Products Industry Toward Permanent Construction

IN FEBRUARY the original plant of the Keystone Slag Co., Reading, Penn., was destroyed by fire. All that was saved were two gyratory crushers. In about four months' time, almost to a day—in June—a new all-steel and concrete structure was turning out its product.

The old structure had not ceased smoking before the engineers of the Traylor Engineering and Manufacturing Co., from the neighboring city of Allentown, were on the job making designs for the new plant. In these designs J. B. R. Hunter, president of the company, one of the first men in this country to produce and market crushed slag, incorporated the results of some of his years of experience.

New structural-steel plant of the Keystone Slag Co., Reading, Penn., and the slag dump

Practically No Transportation Required

The plant is built alongside a "live" slag dump—that is, slag is being constantly added so that the material excavated by the shovel is often hot to touch. Excavating is done with a No. 37 Marion revolving shovel. Five-ton inverted V-bottom side dump cars are used to convey the slag to the plant. The loaded cars roll down by gravity and a team of mules is used to bring them back. As the distance is short two cars keep the shovel in practically continuous operation. The capacity of the plant is between 500 and 600 tons per 10-hr. day.

The slag is fed through a concrete hopper to a 24-in. belt conveyor which discharges over a Cutler-Hammer magnetic pulley separator into the feed end of a 48-in. by 10-ft. cylindrical scalping screen. That material which passes the screen is by-passed to the boot of a No. 7½ (24-in.) belt and bucket elevator, while the oversize goes through the two No. 4 gyratory crushers (recovered from the old plant).

Scalping Screen and Crushers

The output of the crushers joins the by-passed material in the elevator boot and is elevated to the top of the plant where it is sized in a 48-in. by 25-ft. cylindrical revolving screen with a 7x19-ft. dust jacket. Provision is made for a second sizing screen parallel to the first. Oversize from this finishing screen goes to 30x16-in. crushing rolls (Traylor heavy-duty) which discharge to the 24-in. belt and bucket elevator already referred to.

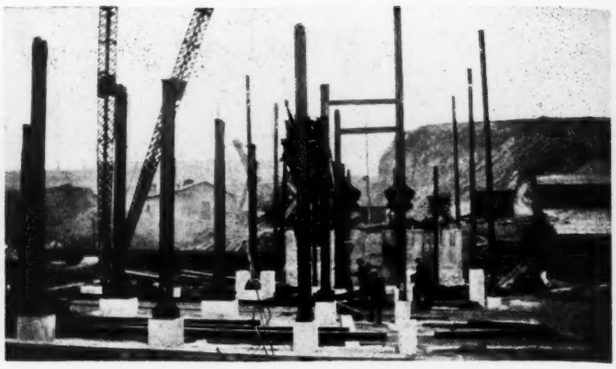
Four cylindrical steel bins 18-ft. in diameter, 21 ft. 6½-in. deep, provide storage for ¼-in., ⅜-in., 1⅛-in. and 2-in. material. The cellular spaces between the cylinders provide storage for the ⅛-in. to dust material.

Electric Vibrating Screen for Roofing Slag

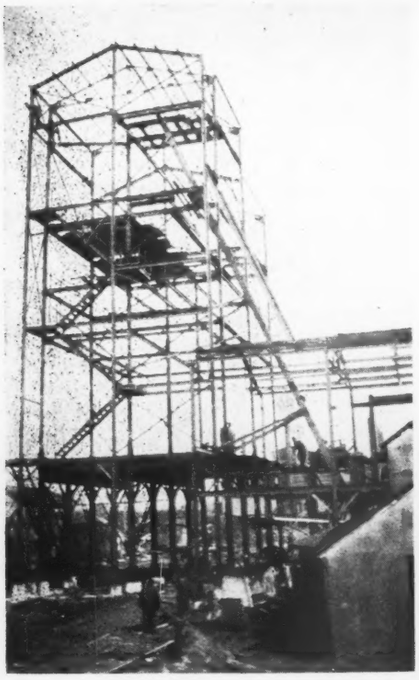
The fine material passing the dust jacket all goes to a Mitchell electric vibrating screen mounted directly over the steel bins. This screen produces an absolutely dust-free roofing gravel, which this plant specializes in, and for which it has a market territory extending over several states.

A complete dust-collecting installation

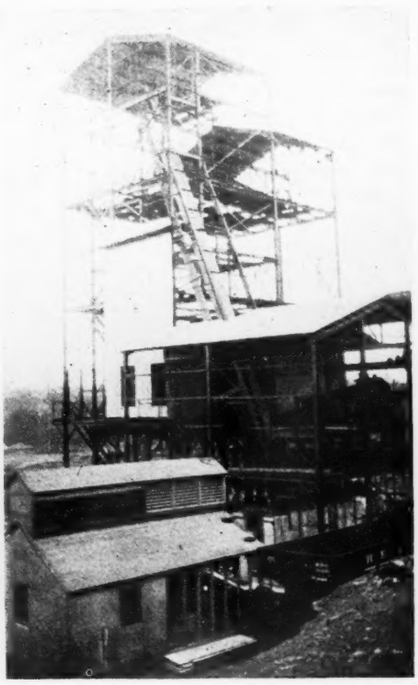
All that was left after the fire in February



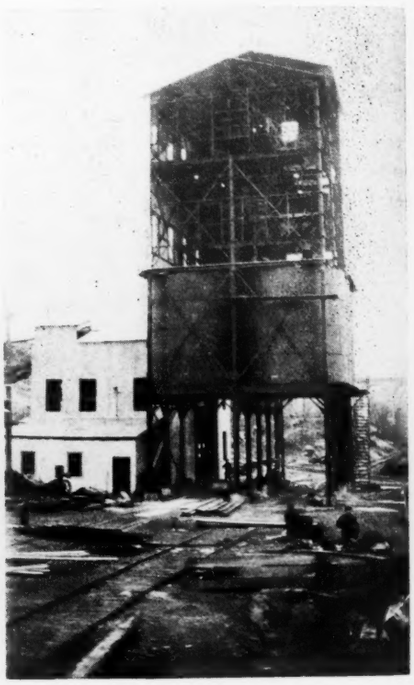
Construction of new plant was begun at once



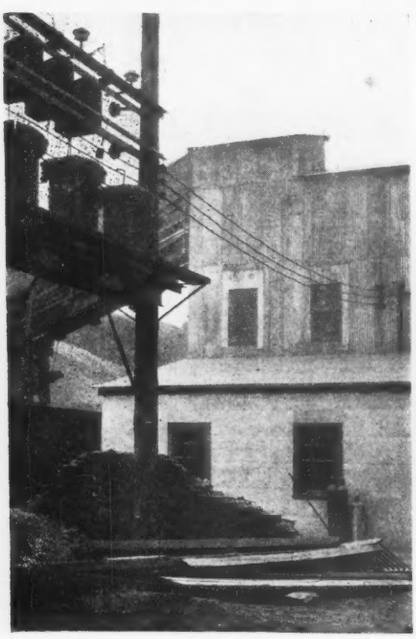
Structural-steel frame nearing completion



Machinery being placed in new plant

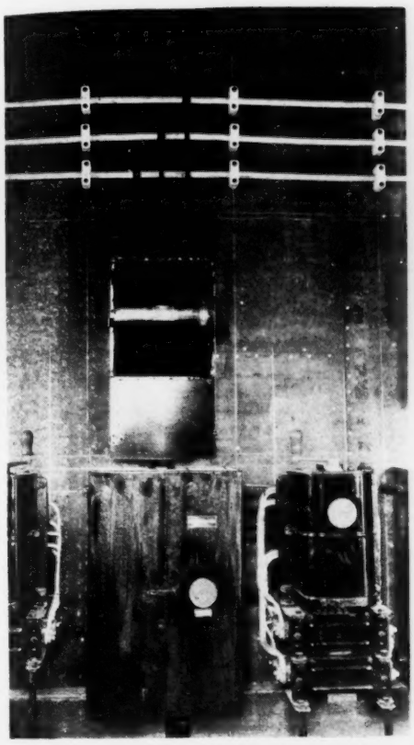


Steel tanks placed and plant ready for siding

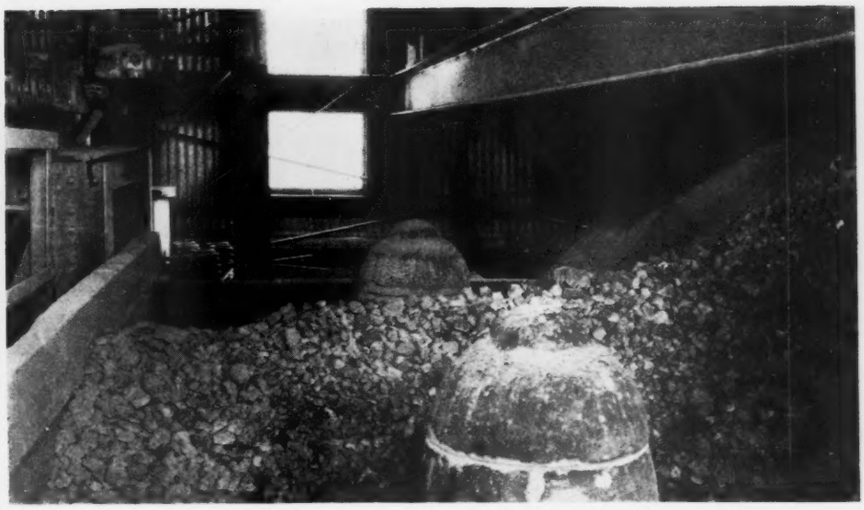


High-tension electric transformer

Cars used from slag dump to receiving hopper run from pit by gravity



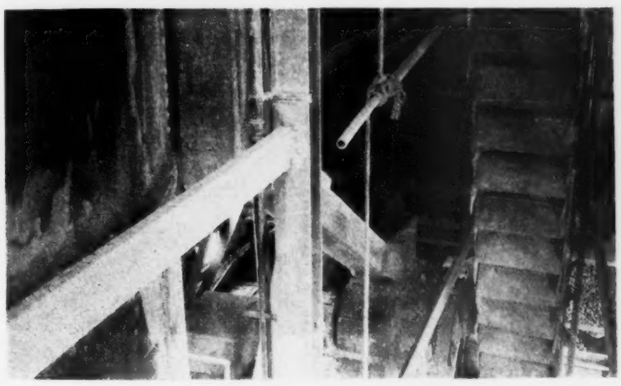
Interior of electric switch room showing motor controls



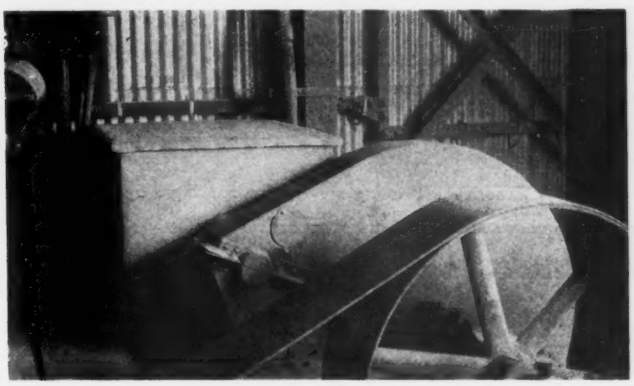
Two gyratory crushers saved from the old plant remounted

is contemplated to save and market 200-mesh dust which now escapes into the atmosphere.

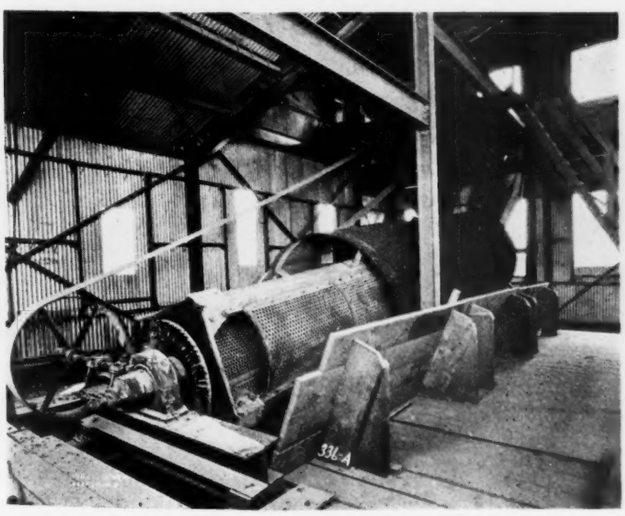
The plans and the views herewith show all the essential details. It will be noted that the plant is especially well powered. One 60-hp. motor drives the entire crushing unit, the two gyratories and the rolls, through a jack shaft. A 25-hp. motor drives the belt conveyor, the magnetic separator and the scalping screen. A 40-hp. motor drives the sizing screen and the bucket elevator. The motor controls are all housed in a special room on the ground floor of the plant, which is a model in every respect, as two of the views show. Motors and controls were all furnished by the General Electric Co



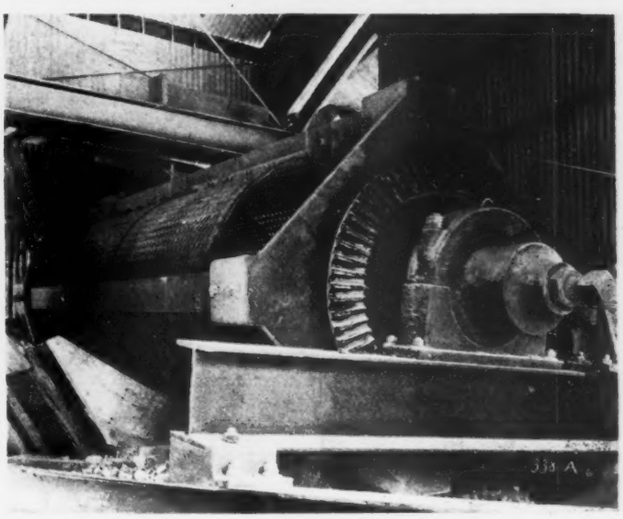
Interior view looking down on crushing rolls, scalping screen and bucket elevator to sizing screen



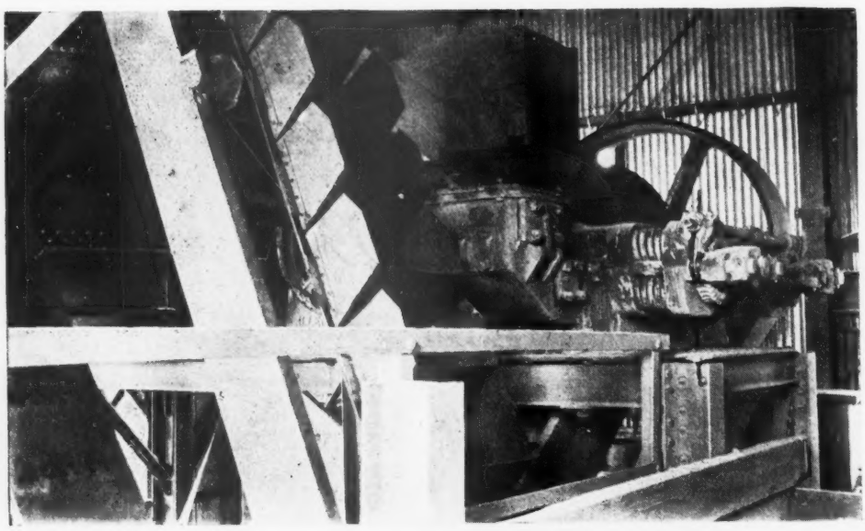
Boxed motor and enclosed chain-drive on elevator and belt-drive on sizing screen



Dust-jacketed sizing screen



Another view of sizing screen



Crushing rolls for recrushing sizing screen rejections

California Limestone Quarry Plant Open Again

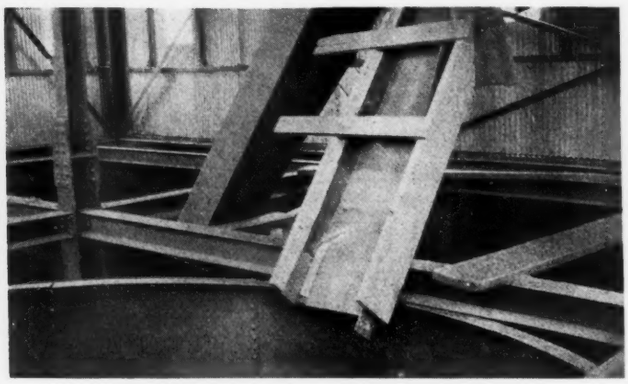
THE California Lime Co. has taken over the plant of the Newcastle Lime Co., near Rattlesnake Bridge, Calif., and F. J. Judge has been placed in charge of the plant for the season that is now under way.

Mr. Judge is enthusiastic about the quality of the lime at the Newcastle plant, and is making arrangements to make about 300 tons of lime daily.

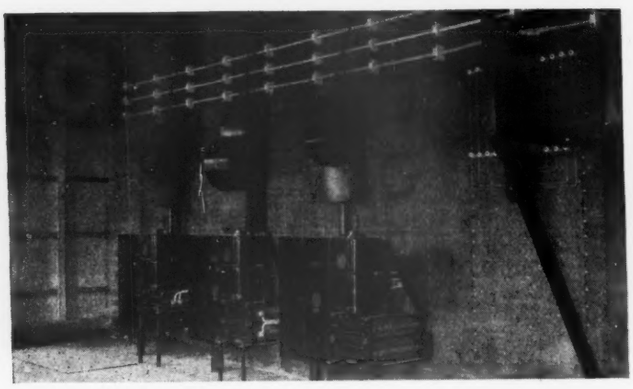
Pulverized lime will be a specialty of the company, according to Judge. He has made arrangements to supply ground tests free for orchardists who are doubtful of the need of lime on their properties.

An Oakland office will be maintained by the company at Fortieth and Opal streets. The product of the local place will be known as the "Calico Brand."

Electric vibrating screen for roofing slag



Tops of storage bins under vibrating screen



View of control room showing wiring in conduit

Loading out the finished product

and the installation designed and installed by the Berks Engineering Co., Reading.

Personnel

The contractor for the plant were the Lehigh Structural Steel Co., Allentown, and for the tanks and their erection, McDermott Bros., Allentown. All co-operated with the owners so that the plant was designed and assembled with remarkable precision and speed.

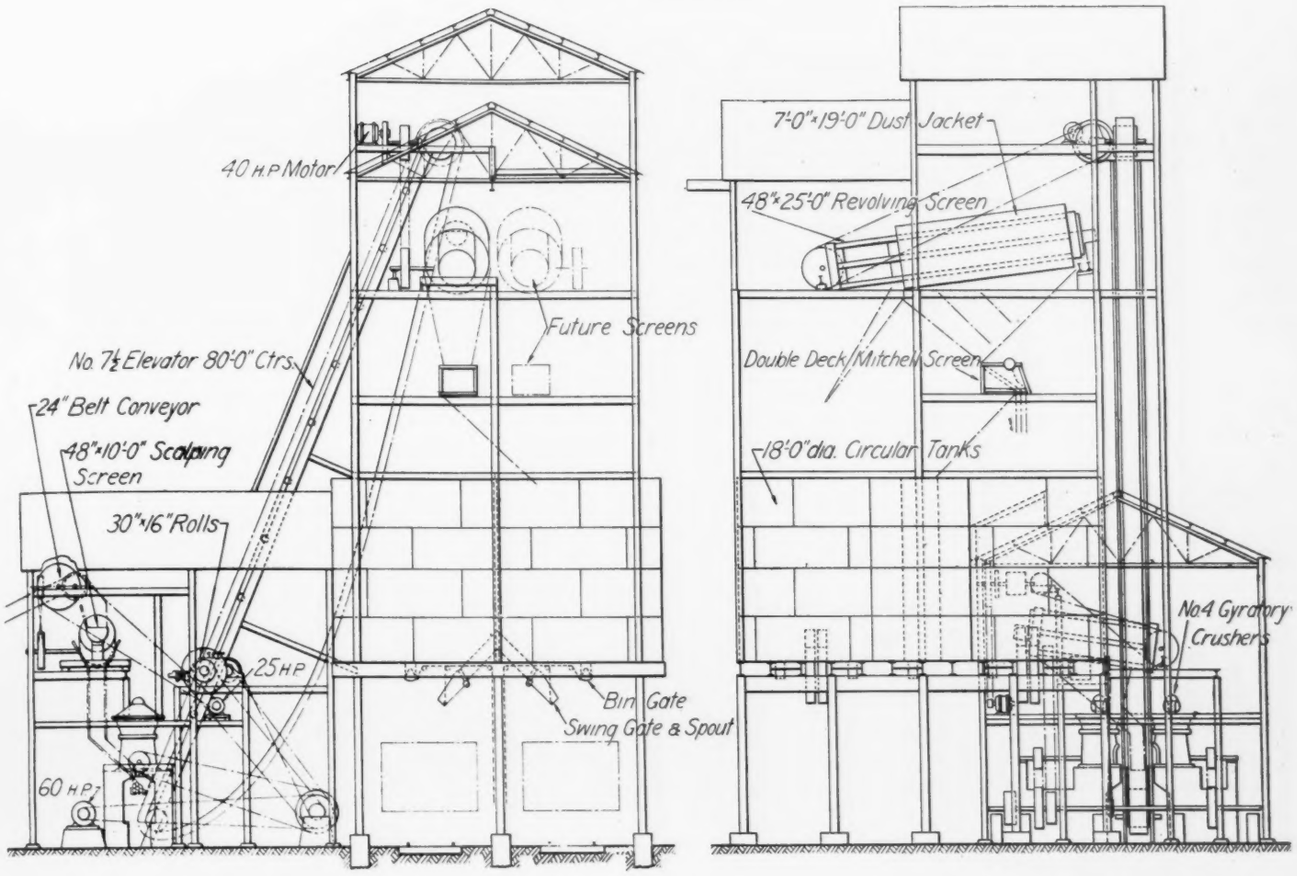
J. B. R. Hunter is president of the Keystone Slag Co.; H. E. Haines, vice-president, and L. Mervine, superintendent.

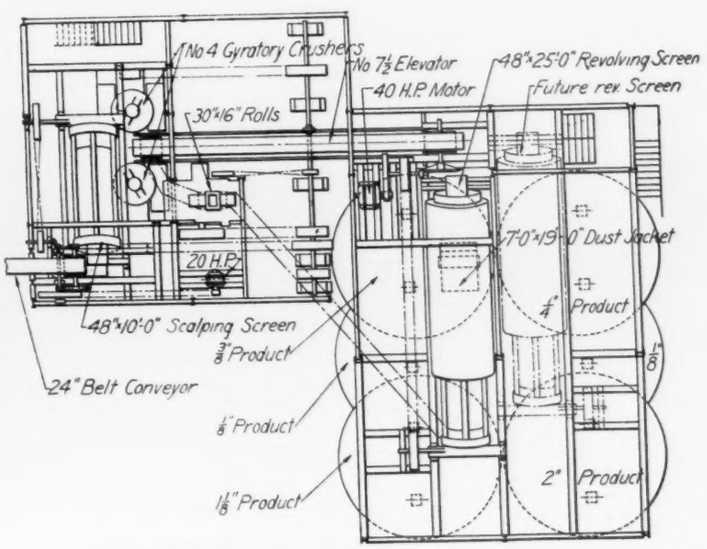
New Use for Sand in Concrete Roads

PARTICULAR attention is being paid to sub base on the Sacramento south paving contract, Division X. A thin cushion of sand, just enough to fill the voids in the rock sub base and bring the base to a perfect grade, is being used with results that more than justify the expense, it is reported by Division Engineer J. C. McLeod.—*California Highways.*

Oil Found in Rock Quarry

OIL has been found in a rock quarry on a farm adjoining Dresden, six miles west of Sedalia, Mo., and arrangements are now under way for drilling a well. H. A. Buehler, state geologist, in a report on specimens of rock sent from the quarry for analysis, reports that residual asphaltum was found to contain lighter constituents such as gasoline and lubricating oil, when distilled off by any national process.—*Edina (Mo.) Sentinel.*





Elevation and plan of Keystone Slag Co. plant at Reading, Penn.

British Foreign Trade in Cement

Alfred Nutting, Clerk, American Consulate, London

BRITISH exports of cement during the first three months of 1924 recorded an increase of 30,200 long tons over the aggregate for the same period of 1923, but 13,264 tons of this advance were due to the inclusion for this year of shipments to the Irish Free State, exports thereto formerly entering into the domestic trade of the United Kingdom. Of the aggregate exports for the first three months of 1924, the British East Indies took 42,653 tons, or 30 per cent, against 35,316 tons, or nearly 32 per cent, in 1923; while unenumerated "other countries" required 54,042 tons, or 38 per cent, as compared with 37,565 tons, or over 33 per cent, a year ago.

Shipments During 1923 and 1924

The average export price on aggregate shipments fell to 51s. 7d. per ton during the first three months of 1924, as compared with 56s. 5d. per ton for the corresponding period of 1923. The exports to the Irish Free State and to New Zealand brought well over 60s. per ton, while those to the Netherlands were under 40s. per ton.

The exports of cement from Great Britain to the principal countries of destination during the first quarter of 1924 compare with those of the corresponding 1923 period as follows:

BRITISH EXPORTS OF CEMENT

Countries of destination	First quarter of 1923 Tons	1923 Value	First quarter of 1924 Tons	1924 Value
Netherlands	8,110	12,288	5,191	9,270
Brazil	13,885	43,616	10,039	21,654
Argentina	1,535	4,120	5,228	11,707
Irish Free State	.....	.....	13,264	42,831
British South Africa	8,160	19,879	3,152	7,817
British East Indies	35,316	104,986	42 653	109,172
Australia	6,011	16,836	7,669	21,205
New Zealand	1,048	3,161	592	1,861
Other countries	37,565	109,939	54,042	139,767
Total	111,630	314,825	141,830	365,284

Pittsburgh Sand and Gravel Producers Are Worried About Future Source of Material

District Now Using 6,000,000 Tons a Year From the Ohio River

By Edmund Shaw
Editor, Rock Products

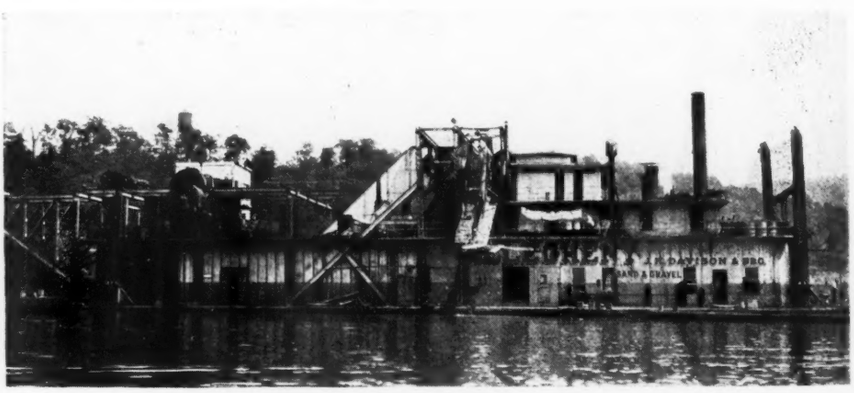
AS ONE RIDES along the banks of the Ohio near Pittsburgh he can look out over the river at almost any time and see a sand barge or a gravel barge being laboriously propelled by a snorting little "stern-wheeler" The Ohio is one of the few rivers in the United States on which the freight borne by water is of much importance and of this freight sand and gravel forms a very considerable part.

Not only does the river provide a highway for the delivery of the sand and gravel, but it furnishes the material itself. There are five large companies, some of which have as many as four dredges in service, digging up the river bed, beside a number of smaller companies. The tonnage removed each year is enormous. One who has a right to speak with authority tells me that in the city itself, that closely built over triangle between the Allegheny and Monongahela rivers, there were yards from which trucks and railroad cars delivered between a million and a half and two million tons last year and that this represented less than a third of the production. It is probable that the production of the district will exceed 6,000,000 tons this year.

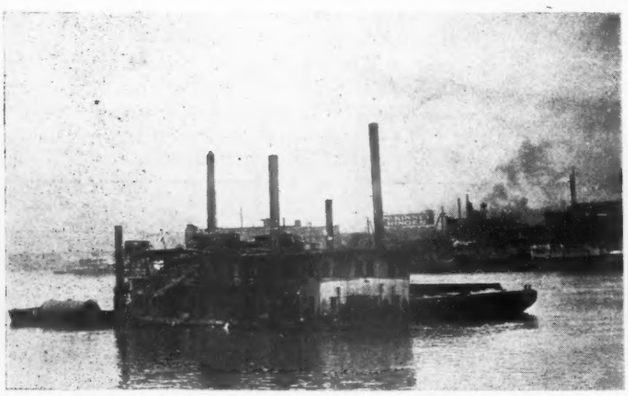
How Pittsburgh Absorbs 6,000,000 Tons of Material

This is not surprising when it is remembered that Pittsburgh is the very heart of one of the greatest industrial sections of the country. And industry demands more and more concrete. Every large machine that is installed must go on a concrete foundation, and if it is along the river there must be concrete piles under the foundation. Around every plant there are new additions and improvements being made constantly, apparently small in relation to the whole but each demanding concrete for foundations, walls and floors. Retaining walls and walks and the like use up a deal of it, Not only the plant engineer but everyone who has a voice in the matter, thinks of concrete first whenever any new construction is planned. Or more truly said, he does not think of anything but concrete.

And Pittsburgh might almost be called the center of concrete products making, for here it long ago outgrew its status of a "back-yard" business and took its rightful place as a major industry. I passed a huge factory the other day around which were some acres covered with concrete pipes and culverts in all sizes from drain pipes to huge tubes that an elephant might crawl through. A look at some of the houses in the newer parts of town is enough to show that the concrete block here as in almost every other part of the country, is fast growing in importance as a building unit. Small as blocks, pipes and other concrete products appear by themselves, we know that in the total they must account for an immense amount of aggregate. It has been calculated (although the writer cannot say with what exactness) that concrete products use as

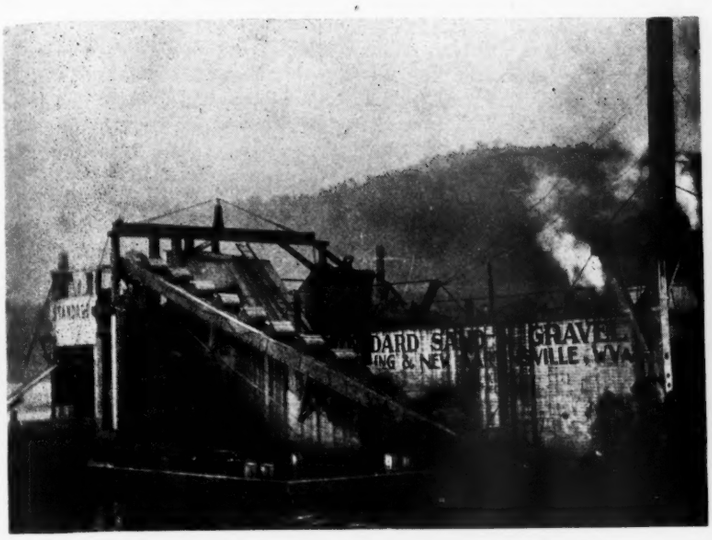


Electric dredge "Allegheny"—the largest in the Pittsburgh district—digs 16 bucketfuls of 21½ cu. ft. each per minute

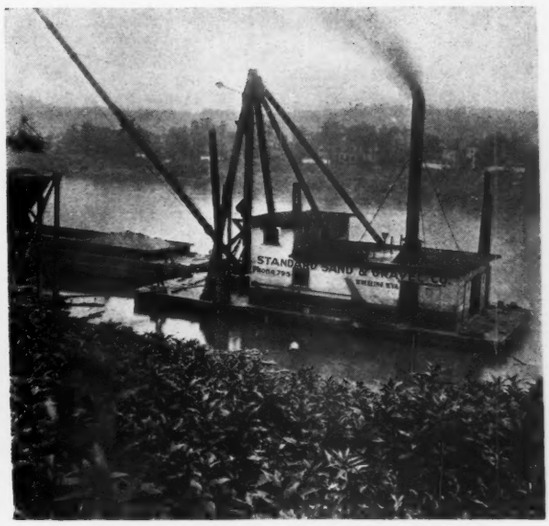


Typical dredge with ladder in center (Pittsburgh)

Boat landing where barges are unloaded (Pittsburgh)



Side ladders dredge of the type used at Wheeling



Derrick boat unloading sand to hopper

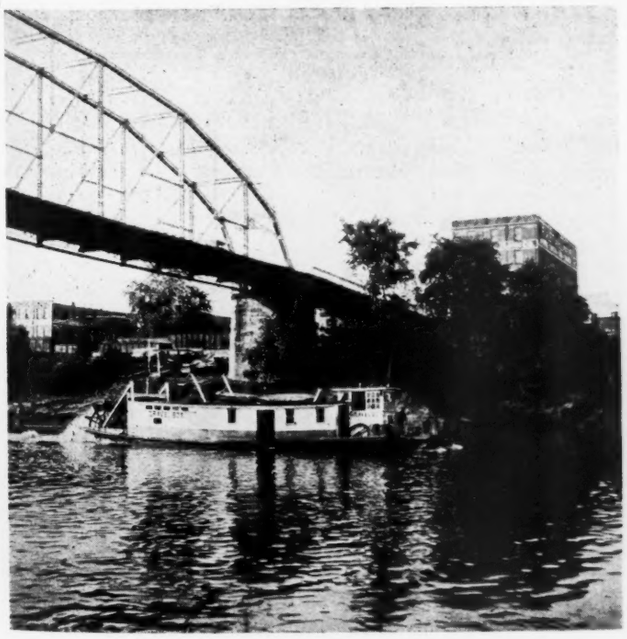
much portland cement as do the concrete highways. If this is so then the aggregate used must be in something like the same proportion.

The Home Owner a Sand and Gravel Purchaser

And finally the home owner, the everyday "man in the street," is beginning to be a sand and gravel buyer. You remember reading perhaps in the report of the National Sand and Gravel Association convention the paper given by Joe Shiely of St. Paul, and how he had found Saturday morning to be the time of heaviest retail sales. He investigated and found that this was due to the home owners who were planning to do a little job of concreting Saturday afternoon and Sunday; concrete steps to replace the old wooden steps or a walk to lay to the garage, or perhaps the foundations for the garage itself. And in the Pittsburgh district there is as much goes on of that kind of work as anywhere, perhaps more.

"I don't know where it all goes to," said Alex W. Dann, president of the Keystone Sand and Supply Co., when I asked him how such an enormous production was absorbed. "It goes into everything. Big jobs, highway work and the like of course we can figure, but beyond these there is an immense amount consumed in small work. Anyway we have learned one thing. Give the people sand and gravel at a reasonable price and make it available—so that a man can get a yard or two with no more trouble than telephoning for it—and they will use a lot of it. The few yards of sand and gravel that are used around a dwelling house do not seem anything as compared with the demands of a big building or a stretch of highway, but in the sum total they must amount to a large tonnage."

Mr. Dann's company has given the people sand and gravel at a reasonable price and made it available; and other producers in Pittsburgh have done likewise. Sand trucks are a common enough sight in the city as they are in every progressive town. But they are getting to be less seen in the daytime, for there is a growing tendency to deliver at night when the streets are free of traffic and when the sand truck does not block the way. The manager of one yard told me



Gas boat used for towing barges. Ohio River Gravel Co., Parkersburg

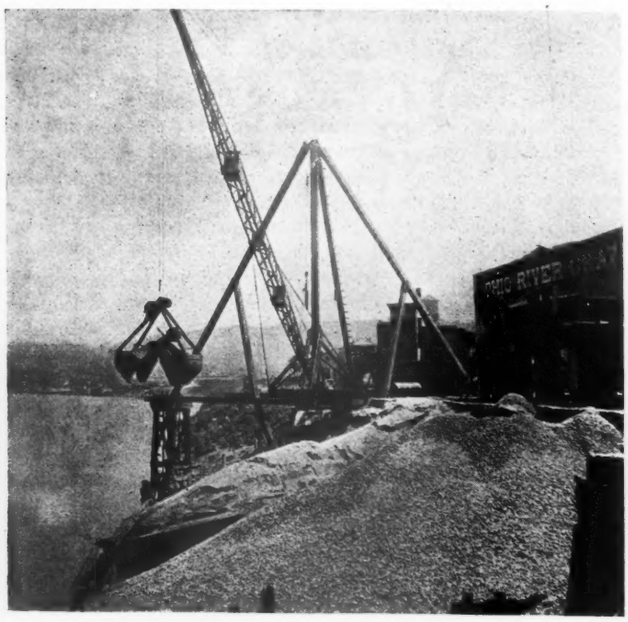
Truck loading hoppers. Inland Rivers Wharf Co., Pittsburgh

that his truck deliveries would run 250 tons every night and that night deliveries were increasing.

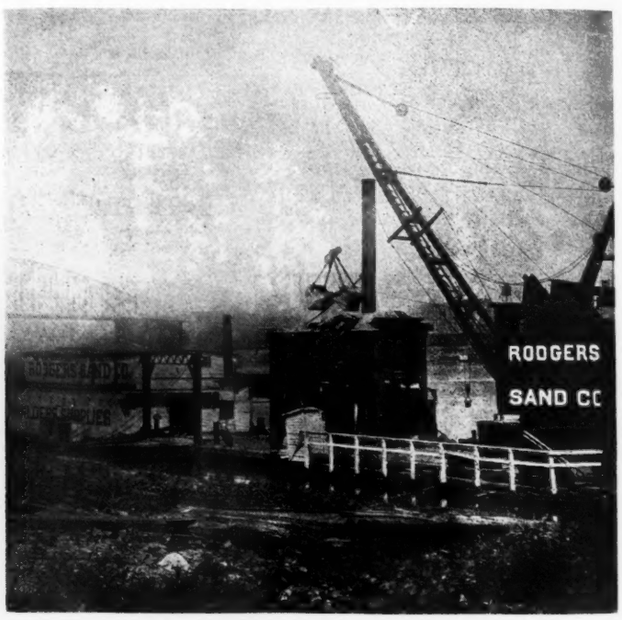
Producers Worried About Supply for Future

The producers at present are not so much worried where the sand and gravel are going to as where they are coming from. Production is being forced to the limit of what can be got out with the river conditions, which are not the best at the moment. And dealers are trying to spread it around among the big consumers to keep all the big orders going without allowing anyone to accumulate a stock. It is decidedly a seller's market.

And this is curious, because on the morning that this is written one of the Pittsburgh papers has an editorial on business conditions that is quite pessimistic in its tone. It points out a heavy decrease in unfilled steel orders and notes that the output of steel ingots is less than half of what it was in March. It also says that while there is a hope of improvement for the future, present economic conditions must be considered unfavorable. Pittsburgh of course has always lived, moved and had its being by steel, so the editor's pessimism is easy to understand. But it might put him in a more cheerful frame of mind if he were to take his eye off the steel industry and look at the various rock products industries for a little while.



Where scows are unloaded to storage and bins. (Wheeling-Ohio River Gravel Co.)



Boat landing where dredges are unloaded (Pittsburgh)

Ohio River Sand Dredges

The dredges which bring up the sand and gravel from the river bed are all much alike. They are of the ladder or bucket and chain type, the buckets usually holding about 5½ cu. ft. The material goes from the buckets to a revolving screen where it is separated into one or two sizes of gravel and sand. The sand and water goes to a pit from which the sand is lifted out by a bucket line much like the one that did the original digging except that is smaller. The dredge has a sand scow on one side and a gravel scow on the other. What little oversize (cobbles) there is, is thrown back into the river.

Perhaps the largest dredge in the upper Ohio is the "Allegheny," belonging to J. K. Davison & Bro. The buckets on this dredge hold 21 cu. ft., while 5½ cu. ft. is the size of the ordinary dredge bucket. All the machinery on the Allegheny is driven by electricity, there being 21 direct-current motors in use. A turbo-generator set furnishes the "juice." This dredge has been in service nearly three years and has made a remarkable record not only in production but in the small amount of time lost on account of repairs and general maintainance work.

To one who is familiar with only the suction dredges so much employed on the rivers of the Middle West, these big ladder dredges look like a tremendous investment in hull and machinery for the amount of sand and gravel they dig. But as usual, there's a reason. The suction dredge has been thoroughly tried out on the Ohio. Below Huntington, W. Va., only suction dredges are in use. The reason why the ladder dredges are used on the upper part of the river is that the gravel is usually covered with streaks of "hard pan" which may be anything from 8 in. to 2 ft. in thickness. Even the cutters with which the better designed suction dredges are equipped would find it hard to deal with this material. But the ladder dredges can dig anything that is "digable." In the California placer fields, where the ladder dredge has been perhaps more fully developed than anywhere else, it is the usual practice to dig about 2 ft. from the bed rock that underlies the gravel. Usually this bed rock is a hard shale.

The smaller dredges at Wheeling and at Parkersburg and other towns farther down the river are usually of the "side-ladder type." The bucket line is carried in a steel frame which is pivoted at the top on the side of the hull, the bottom being raised or lowered as demanded by the digging. This type of dredge is much cheaper to build than that which has the bucket line in the center, but the construction is not so good. The digging strain on the side is hard on the hull and the arrangement of the machinery is rather awkward. So it is only used in the smaller dredges. The buckets on some of these side ladder dredges hold less than 3 cu. ft.

Barges and Tow Boats

Both wooden and steel barges are used for transporting the gravel, but by far the greater number that the writer saw in the Pittsburgh district were built of steel. Both hopper and flush deck barges are used. The hopper barge seemed to be more used here than at other gravel producing centers and one reason for this, perhaps, is that this type of barge seems to be universally used for carrying coal and hence is available. There are a great many coal pockets along the rivers to which coal is brought by barges.

Both steam and oil engines are used in

the tow boats that bring in the barges from the dredges, all the newer boats having oil engines. A typical new tow boat has a 100-hp. 4-cylinder, semi-Diesel engine and can easily handle one of the big barges, which will hold from 400 to 500 tons of sand and gravel. Some of them hold 600 tons. If the reader is interested he will find an excellent paper on barging sand and gravel in the Pittsburgh district by Alex W. Dann in the March 8th issue of Rock Products.

Unloading Plants

The landings are equipped in all sort of ways from the simplest to the most complete that the writer at least has noted. "Whirlie" cranes with 1½-yd. and 2-yd. buckets are universally used for unloading from barge to bin, some of them set on solid concrete pillars while others are of the gantry type running on a 16-ft. gage track. At the Inland Rivers wharf there is a gantry crane which unloads to concrete storage bins or to smaller steel truck bins. This plant has also rescreening equipment for taking out the last traces of fines from the gravel, and a heating plant by which steam is piped to the truck bins in the winter time to prevent the sand and gravel from freezing. This plant is worth a story of its own, it is so beautifully kept. All the structures are of steel and concrete and the yard is everywhere concreted except where it has been sodded to make a fine lawn. The grounds are enclosed by a neat iron fence which will be covered with climbing roses in another year. Roses in a gravel plant! And yet, why not? Why shouldn't a man take the same pride in the beauty of his surroundings while he is at work as he does while he is at home?

Fast Using Up River Gravel

The sand and gravel business at Pittsburgh is a great industry; but there are those who claim that it will decline in a few years. Not from want of market, for that will naturally increase here as everywhere else. But the Ohio river bed is already showing the effect of so much dredging and the big "diggers" must go farther and farther from the city to find material. Only a few years ago one would have said the supply was "inexhaustible" but we know now that there is no such thing as an inexhaustable supply of any raw material.

And there is an abundance of other concrete aggregate material in the district, notably slag. Pittsburgh is one of the largest producers of crushed slag in the country and not only consumes it in the city but ships it to considerable distances.

Some Requirements in the Study of Portland Cement*

Quest for Better Concrete Must Give Attention to Inherent Characteristics of This Most Important Ingredient

By Thaddeus Merriman

Chief Engineer, Board of Water Supply, City of New York

AMONG the many materials used in the world of engineering construction none is of more importance or of greater utility than portland cement, which has come to be the basis of nearly all concrete made with calcareous binders. Our knowledge regarding the qualities and characteristics of cement, however, is not as far advanced as is that relating to others of the manufactured materials which enter into the numerous structures designed and built under engineering supervision. The reason for this condition is apparently to be found in the extremely complex nature of the material itself. Chemical analysis does not serve to distinguish or identify the nature of the several compounds of which the cement is composed. Microscopic examination has been helpful and has done much toward advancing the sum total of information on this important question. Many physical tests of various kinds have been suggested and countless thousands of briquets and cylinders have been broken but the mystery as to what occurs in the process of "setting" has never been solved. No explanation which fits all of the observed facts relating to this phenomenon has yet been advanced.

The search for a better concrete, as evidenced by most of the recent investigations, seems to have for its object the securing of a more uniform quality with respect to careful selection, proportioning and mixing of the constituents and with the end in view of securing a maximum of strength for a minimum of cost. Strength, apparently, is the only criterion by which quality and durability are judged. But what relation is there as between the strength of concrete at 28 days and its ultimate durability?

Nearly all concrete is good when first placed. In many situations it continues good and is possessed of a high degree of durability and permanence. In other situations, however, disintegration sooner or later begins and progressively continues. In many such cases the principal contributing cause is probably the porous nature of the concrete while in a fair percentage of cases the causes of disintegration are obscure and cannot be ascribed to any particular condition.

A portion, at least, of the troubles which sometimes occur arises from the fact that, quite unconsciously, we have come to consider cement as a universal material suitable for use everywhere and under all conditions. There is only one standard grade of cement but many different qualities of steel are to be had for the asking, and each one of them fills a particular need. So, also, should it be with cement. The general use of one grade of material for all purposes does not tend toward true and ultimate economy.

Cements Not Alike

The art of mixing and proportioning concrete has been advanced to such an extent that it is now possible, by considering the sizes, the relative fineness, and the proportions of the aggregates, and by controlling the mixing water, to "design" a concrete mixture so as to secure, for a given cement content, a maximum of strength and density, as these terms are commonly understood. These studies generally, however, take no account of the differences which exist between different types of cement, and so it happens that results obtained with one type cannot be duplicated when another is used. The assumption tacitly made by many investigators, that all cement which passes the requirements of the standard specification is of equal quality, is untenable. Some types of cement will produce concrete of greater strength than will others. Certain types are less sensitive to an excess of mixing water; others will produce a high early strength; still others will not give a high strength until after the lapse of months. As has long been recognized, the age of the cement is also a vital factor in affecting the activity and integrity of its constituent components. Can it, then, be fairly assumed that all types of cement produce concrete of equal permanence?

The very best mixture of the finest obtainable aggregates is of itself useless as concrete. The material which binds the mass together is the cement and no amount of care in proportioning the sand, the stone and the water and in making the concrete according to current good practice, can overcome a deficiency which may exist in that ingredient. The search

*From "Engineering News-Record," July 17, 1924.

for a better and a more uniform concrete, necessary for many purposes, seems to have arrived at the stage which indicates that the next logical step is an examination of the cement itself.

When the field of study and endeavor in matters relating to calcareous cements is reviewed, the one outstanding feature to be observed is that these investigations have proceeded on the principle of direct observation under limited conditions and in restricted combination. Little, if any, effort in reported results has been put forth along the line of indirect and collateral analysis, a method which has proven to be of the greatest use in practically all those lines of scientific endeavor in which great and substantial progress has been recorded. Similar methods of research must be employed on the problem of cement, else the cause of concrete will fail of substantial progress.

Why Not a Neat Tensile Test?

In 1917 the "Standard Specifications and Tests for Portland Cement" of the American Society for Testing Materials were revised and the requirement of a test for the tensile strength of neat cement briquets was eliminated. This test was the only physical test of the cement *per se* which the specifications contained, because the 1:3 motor test briquet discloses not the strength of the cement but rather its ability to adhere to the grains of the Ottawa sand with which the specimen is made. This statement will become clear if the broken end of any 1:3 briquet is examined and it is seen that about 45% of the area of fracture consists of clear sand grains from which the cement has cleanly parted while another 45% consists of the cavities left by the sand grains of the other half of the briquet. This test, evidently, is a measure of the adhesive quality of the cement and is by no means an index of its inherent tensile strength.

The tensile test of neat cement when mixed to the standard consistency called for by the specifications prior to 1917 was abandoned for a variety of arguments, among which the following may be cited:

1. The test is unnecessary. It discloses nothing which the sand briquet does not show.
2. Tensile tests, at best, are not of great utility. Compressive tests are of more value. The usual forces which concrete and mortar are called upon to resist are those of compression and shear.
3. The test is not a fair one. As the strength of the specimen increases, it becomes more and more brittle, with the result that the stresses set up by the grips of the testing machine become so complicated as to render the results of doubtful value. Thus, the retrogression in strength from 7 to 28 days often noted is not due to any inherent quality of the cement but is the result of the rigidity incident to increased strength.
4. The results as between the tests on the neat and the sand briquets are often conflicting and not to be reconciled.

It has already been shown that the first of these arguments was far from being sound. As to the second, it only seems necessary to point out that whenever concrete or mortar fails under stress the evidence nearly always indicates a failure in tension or in shear. It seems extremely doubtful that any material can fail under a compressive force unless its tensile and shearing resistances are first overcome. In general, if all other conditions are the same that material which shows the highest tensile strength will develop the greatest resistance to compressive forces. In the case of concrete and mortar, however, it seems as though the reverse were often true. This point will be discussed in detail at a later time.

The third argument, as above stated, while of itself plausible enough, does not seem to be sufficiently convincing by itself to warrant the exclusion of a tensile test on the cement. The fourth argument was based on the facts as observed but not on a true understanding of their meaning because it failed to take account of the essential differences in the fundamental nature of the tests themselves.

The neat test was an index of the quality of the cement when mixed to the standard consistency with about 20 to 25% of water. On the other hand, the sand briquet test was made by mixing three parts by weight of Ottawa sand with one of cement and with an amount of water which averaged from 39 to 43% of the weight of the contained cement. In view of the known effect of water on cement it could not be expected that the results of these two tests would always be concordant. Some types of cement will take care of greater quantities of water than will others—that is to say, all cements do not behave in the same manner when mixed with equal quantities of water. These two tests, moreover, are of a different nature; the cement particles in the neat briquet lie very much closer together than they do in the sand specimens. The first of these tests is a measure of the adherence between the cement particles; the second is an index of cohesion between cement and sand grains.

The foregoing briefly outlines certain fundamental considerations that need to be given extended study in connection with the development of tests which will more truly disclose the quality of cement than do those now available. In setting forth these considerations no criticism of portland cement or of the present specifications is intended. The important thing is that our knowledge regarding cement, its qualities and its characteristics, should be broadened to the greatest possible extent. The omission of the neat test has served to focus attention on a phase of the subject which might otherwise have escaped notice for many years and has thus come to serve a most useful purpose.

What Should Be Studied

A complete and comprehensive outline looking toward the determination of quality and the classification of different types of cement will include at least some of the following:

1. Permissible variations in chemical composition and characteristics, with limitations on certain of the ingredients.
2. Requirements as to fineness of grinding, both before and after burning.
3. Tests for the tensile and compressive strength both with and without sand.
4. Requirements as to behavior in the presence of varying quantities of water.
5. A determination of the amount of each of the cementing constituents which may be present.
6. Requirements as to the speed and the order in which the hydration of the several constituents is completed.
7. A limitation as to the permissible change in quality resulting from age.
8. A requirement for soundness and constancy of volume.
9. A test for the completeness and uniformity with which the clinker has been burned.
10. A test for the time of "setting."
11. A requirement as to uniformity of mixture of the raw materials before burning.
12. A limitation as to permissible admixtures.
13. A limitation as to the use of water for the quenching of the clinker.

Before progress toward a better understanding of the factors which govern the inquiry can be made, it is advisable to list tentatively the characteristics of what may be termed the ideal cement. By so doing the desired goal will be kept clearly in view and, at the same time, the scope and character of the examinations and studies requisite to the solution of the problem will, in some measure, be disclosed. These characteristics may, in general, be stated as follows:

1. A maximum strength at a minimum of cost.
2. A maximum of density, durability and permanence.
3. A minimum of solubility both in and out of water.
4. A maximum of tensile strength under all conditions and in all directions within the mass.
5. A maximum of stability as against the development of internal stresses due to internal change of form.
6. A minimum of deterioration during storage, and
7. Within reasonably wide limits a minimum of susceptibility to variations in the quantity of mixing water.

At a later time there will be outlined the result of certain investigations and observations which, for several years, have been in progress in the laboratory of the Board of Water Supply, New York City. These investigations have been carried on, under the direction of the writer, by L. B. Stebbins, assistant to the chief engineer.

On the Constitution and Burning of Artificial Portland Cements

Part V—Products of Complete and Incipient Fusions of Silica and Alumina with Varying Quantities of Lime and the Effects of Cooling

By J. E. Duchez, Engineer

(Authorized translation from the French Revue des Materiaux de Construction by C. S. Darling)

IF WE place together in a crucible, two molecules of lime for one of silica and one of alumina, the fused mass afterward being pulverized by slow cooling the powder, will not set, even after passing through grinding machinery. Cooled abruptly, the melted mass remains stable; pulverized and moistened with water, it sets slowly.

Examined under the microscope, the

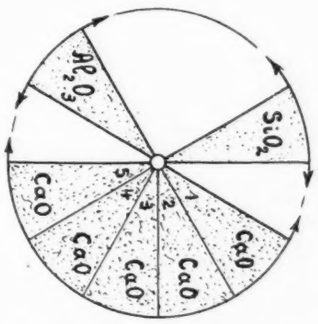


Fig. 5—One molecule of silica and one of alumina with five of lime, uncombined, before burning

reaction is slow but there are clearly discernible some scattering needles of hydrated alumina and spherulites of calcium aluminate as well as some fine needles of hydrated calcium silicate; then there are formed slowly some hexagonal lamella scarcely visible in a gelatinous mass which makes observation difficult.

With the products formed only by incipient fusion, we find a more definite set; after hydration there is clearly observed the formation of spherulites and hexagonal lamella of calcium aluminate, a few rare grains which give birth to fine needles of hydrated calcium silicate, and some inert grains. Then, as with the fused product, a gelatinous mass appears which puts an end to observation.

If the lime content is held at three molecules for one of silicia and one of alumina, a melted mass is obtained which on slow cooling pulverizes partially and sometimes wholly. Cooled abruptly, the mass remains stable; it granulates like a slag if poured into water.

In all these forms, when pulverized and moistened the products have a rather rapid set. (*1) We note under the microscope the formation of spherulites and separated or intermingled needles of aluminate, but the plate becomes rapidly opaque from the development of a gelatinous mass. The formation of needles of hydrated calcium silicate is not distinguished, or only uncertainly.

The fused mass must correspond to Si O_2 2 CaO+Al_2 O_3 CaO, and therefore to the formula of the fused cements given by M. Bied.

The hydration must correspond to the formula Si O_2 2 CaO+Al_2 O_3 CaO+aq =Si O_2 CaO aq+⅔ (Al_2 O_3 3 CaO)x aq+ ⅓ Al_2 O_3 aq.

The addition of hydrate of lime makes the set extremely rapid, and it is impossible practically to see what is on the plate.

The hydration of the melted mass after pulverization to 4900 mesh (approximately 175 mesh in American or English units), takes place in about two hours, the strength increasing positively until toward the 60th hour, then decreasing slightly followed by an increase in

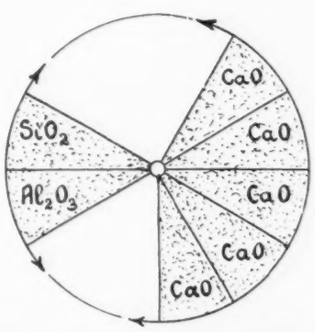


Fig. 7—At another temperature the silica and alumina combine first

strength until the 8th day. We have not observed beyond this.

At the 60th hour the strength of a neat cement was from 385 to 416 lb. per sq. in., reaching 715 lb. at the eighth day, while 462 to 522 is noted between the 50th and 60th hour.

This diminution has perhaps been peculiar to our samples as a consequence of variations which may be produced in the cooling of the fused material and because we mixed before pulverizing pulverization products to others which remained stable. However, we have

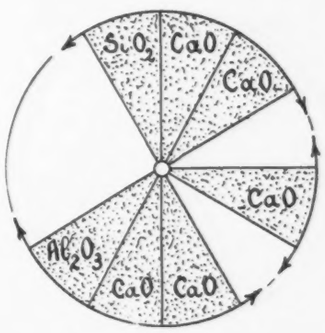


Fig. 6—At a certain temperature two molecules of lime combine with the silica and alumina

noted the same diminution for four samples obtained with granulated products. (*2)

This diminution in the set can be explained by the more rapid hydration of the aluminates than of the silicates and by the reactions of the hydrated alumina and hydrated lime dissociated in different times, the crystallization of which must interfere with the cohesion and adhesion of the mixture toward the third day. The resumption of increasing strength commences as soon as equilibrium is established once more.

The products obtained by incipient fusion are also very difficult to examine; in any case their strength is not over 1 kg. (14 lb. per sq. in.) at 48 hours in neat cement, and often it is lower. The set varies greatly, and is generally much slower than for the fused products. At

(*1) The set commences toward the second hour and ends around the fifth.

(*2) M. Brissaud has always found this diminution of strength in aluminous fused cements of formula x(Si O_2 2 CaO)+Al_2 O_3 CaO. It is not peculiar, therefore, to our samples.

eight days the briquettes show 7 to 8 kg. (96 to 110 lb. per sq. in.) in neat cement. The addition of hydrated lime makes the set more rapid but decreases the strength.

If we increase the lime content to four molecules for one of silica and one of alumina, the fused mass sometimes remains stable on slow cooling. It is always stable on rapid cooling. The low-

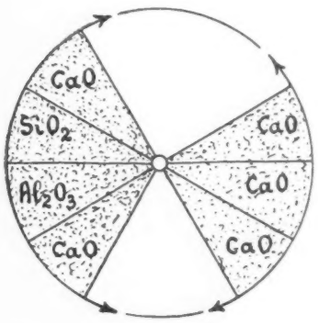


Fig. 8—Later reaction than Fig. 7, forming silicates and aluminates of lime

burned products are unstable on slow cooling.

Pulverized and moistened, the fused products set rapidly, while the low-burned products have a variable set according to the length of burning.

The addition of hydrated lime to low-burned products produces different effects of acceleration or retardation on the time of set while there is always acceleration with the fused products. This last is not very noticeable because of the extreme rapidity with which the fused product sets, even without the addition of hydrated lime; at any rate, no retarding effect is noticed unless the quantity of hydrate of lime

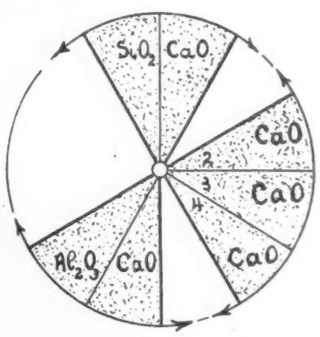


Fig. 9—It is hardly likely that this will occur by increase of temperature to Fig. 8

added is beyond the limit permissible for retaining strength.

Examination under the microscope of the fused products is scarcely possible. Spherulites and hexagonal lamella are always noticed, but the gelatinous mass develops so rapidly that nothing remains visible after a few minutes.

The products brought only to incipient fusion can be examined more easily; their time of set is variable, and this must depend on the time of burning which causes a variation in the aluminate which is formed beside the silicate. The strength varies from 8 to 32 kg. (110 to 440 lb.) at eight days in neat cement. There must be some explanation of these phenomena.

According to the temperature and the time the mass is maintained at incipient infusion, there must be formed:

$Si\ O_2+Al_2\ O_3+4\ CaO=$
$Si\ O_2\ CaO+Al_2\ O_3\ 3\ CaO$
$Si\ O_2\ 2CaO+Al_2\ O_3\ 2\ CaO$
$Si\ O_2\ 2.5\ CaO+Al_2\ O_3\ 1.5\ CaO$
$Si\ O_2\ 3CaO+Al_2\ O_3\ CaO$

We have made many attempts to obtain different lengths of time in burning for the same temperature, but fusion is so close to incipient fusion that it is impossible. It is necessary to vary both factors at once, and necessarily we can note only differences in both time and temperature of burning, without exact rules. As to later differentiating the products by examination in polarized light, before or after hydration, we do not believe this possible, or in any case so lacking in precision that it is better not to attempt it.

These different formulas will hydrate as follows:

$(Si\ O_2\ CaO+Al_2\ O_3\ 3\ CaO)+aq=Si\ O_2\ CaO\ aq.+Al_2\ O_3\ 3\ CaO\ aq$ (1)

$(Si\ O_2\ 2\ CaO+Al_2\ O_3\ 2\ CaO)+aq=Si\ O_2\ CaO\ aq+Al_2\ O_3\ 3\ CaO\ aq$ (2)

$(Si\ O_2\ 2.5\ CaO+Al_2\ O_3\ 1.5\ CaO)+aq=Si\ O_2\ CaO\ aq+Al_2\ O_3\ 3\ CaO\ aq$ (2)

$(Si\ O_2\ 3\ CaO+Al_2\ O_3\ CaO)+aq=Si\ O_2\ CaO\ aq+Al_2\ O_3\ 3\ CaO\ aq$ (2)

In formula (1) the monocalcic silicate being inert in the presence of water, only the aluminate can set.

In formulas (2), all the silicates with 2, 2.5, and 3 molecules of lime set according to the following formulas:

(a) $Si\ O_2\ 2\ CaO+aq=(Si\ O_2\ CaO)\ aq+CaO\ aq$

(b) $Si\ O_2\ 2.5\ CaO+aq=(Si\ O_2\ CaO)\ aq+1.5\ CaO\ aq$

(c) $Si\ O_2\ 3\ CaO+aq=(Si\ O_2\ CaO)\ aq+2\ CaO\ aq$

While the corresponding aluminates hydrate and set according to the formulas:

(a) $Al_2\ O_3\ 2\ CaO+aq=\frac{2}{3}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{1}{3}\ Al_2\ O_3\ aq$

(b) $Al_2\ O_3\ 1.5\ CaO+aq=\frac{1}{2}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{1}{2}\ Al_2\ O_3\ aq$

(c) $Al_2\ O_3\ CaO+aq=\frac{1}{3}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{2}{3}\ Al_2\ O_3\ aq$

There will therefore be a time during the set when we shall find the conditions:

(a) $(Si\ O_2\ CaO)\ aq+CaO\ aq+\frac{2}{3}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{1}{3}\ Al_2\ O_3\ aq$

(b) $(Si\ O_2\ CaO)\ aq+1.5\ CaO\ aq+\frac{1}{2}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{1}{2}\ Al_2\ O_3\ aq$

(c) $(Si\ O_2\ CaO)\ aq+2\ CaO\ aq+\frac{1}{3}\ (Al_2\ O_3\ 3\ CaO)\ aq+\frac{2}{3}\ Al_2\ O_3\ aq$

That is to say, in the presence of definite crystallizations $(Si\ O_2\ CaO)\ aq$ and $x\ (Al_2\ O_3\ 3\ CaO)\ aq$, and in the presence of $y(CaOaq)$ and $z(Al_2\ O_3\ aq)$ these are still susceptible to react among themselves to form hydrated tricalcic aluminates.

(a) $CaO\ aq+\frac{1}{3}\ Al_2\ O_3\ aq=\frac{1}{3}\ (Al_2\ O_3\ 3\ CaO)\ aq$

(b) $1.5\ CaO\ aq+\frac{1}{2}\ Al_2\ O_3\ aq=\frac{1}{2}\ (Al_2\ O_3\ 3\ CaO)\ aq$

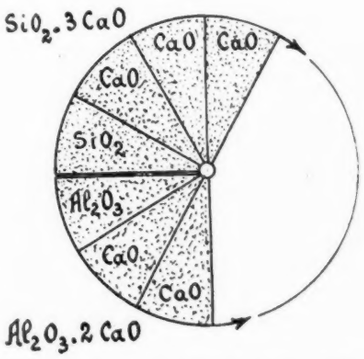


Fig. 10—According to some authors tri-calcium silicate is formed in this way

(c) $2\ CaO\ aq+\frac{2}{3}\ Al_2\ O_3\ aq=\frac{2}{3}(Al_2\ O_3\ 3\ CaO)\ aq$

It is difficult to determine in what time the dissociation of CaO aq and $Al_2\ O_3$ aq is accomplished following the molecular composition of the aluminates and the silicates. All that can be said is that that of $Al_2\ O_3$ aq is more rapid and commences before that of CaOaq of the silicate. It is not certain that the reactions between $Al_2\ O_3$ aq and CaO aq are complete.

In any case, practically, and without being able to say to which formula the result applies, we determine the differences

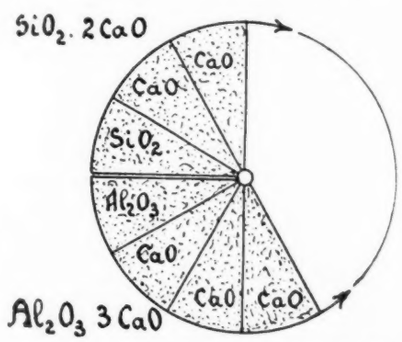


Fig. 11—The author considers this a more likely result than that shown in Fig. 10

in the time of set of products obtained by fusion and by incipient fusion, and especially the differences in strength for the products obtained by fusion, for which it has been almost impossible to measure the much too rapid time of set.

These differences can be explained theoretically only by the formation in burning of different systems of crystalli-

zation since the materials placed in contact, being the same and in the same quantity, should give, if everything were the same, the same product in the set.

$Si\ O_2\ CaO\ aq + Al_2\ O_3\ 3\ CaO\ aq$

and consequently the same time of setting and the same strength. It must be admitted that besides the chemical composition other factors enter.

Suppose for example a mixture in the proportions one molecule of $Si\ O_2$, one

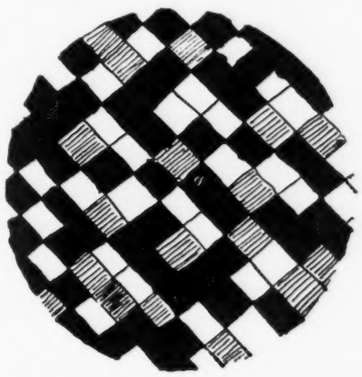


Fig. 12—Schematic representation of the crystallographic grouping

molecule of $Al_2\ O_3$ and five molecules of CaO and represent separately around a center each of the constituents in proportion to the number of molecules (Fig. 5).

Under the action of the temperature of burning and in accordance with that temperature the constituents will combine and the compounds thus formed in a determined time will be variable according to the affinity of the individual constituents for one another.

The reactions, therefore, may commence according to the temperature with those of silica and lime or those of alumina and lime or by both combinations at once (Fig. 6). But instead of beginning with the formation of silicate and aluminate of lime at the same or at different times, the reaction may commence with the formation of silicate of alumina (Fig. 7) which would react later with the lime to form silicates and aluminates of lime (Fig. 8).

The fusion being started, the breaking down of the molecules of lime will continue if the temperature is maintained or increased, but it is hardly likely that the silica and alumina will react with equal quantities in equal lengths of time as we have represented in Fig. 9.

Supposing this to be so, where will the remaining molecule of CaO go, to the silicate or the aluminate already formed, or will it be split into two parts, one part going to one and one part to the other?

Since some authors believe in the formation of tricalcic silicate, it is possible that the silica absorbs this third molecule of lime (Fig. 10), but it is much more likely, at least nothing prevents, that it is the aluminate which absorbs it (Fig. 11).

It is certain that the aluminates are more fusible than the silicates and it is very likely that the lime goes first to the alumina to form the tricalcic aluminate which is the more fusible. But if the temperature increases and reaches the crtical point of fusion (Figs. 10 and 11) it is probable, if this is maintained, that there will be a constant passage of the molecule of lime to the silicate and to the aluminate according to the reversible reaction below:

$$Si\ O_2\ 2\ CaO + Al_2\ O_3\ 3\ CaO$$
$$Si\ O_2\ 3\ CaO + Al_2\ O_3\ 2\ CaO$$

If the temperature rises, there may be a moment of equilibrium which can be maintained by sudden cooling corresponding to the mean formula:

$$Si\ O_2\ 2.5\ CaO + Al_2\ O_3\ 2.5\ CaO$$

or the molecule of lime may be attached to the silicate if the temperature is raised still more before the cooling:

$$Si\ O_2\ 3\ CaO + Al_2\ O_3\ 2\ CaO$$

If on the contrary the temperature drops slowly, it is probable that the molecule of lime will remain with the aluminate.

$$Si\ O_2\ 2\ CaO + Al_2\ O_3\ 3\ CaO$$

Although the quantities of the ingredients are different, this must be what happens in the manufacture of the fused cements, and according to the moment when the movement is stopped in the fusion, products with different setting periods and strengths are obtained. M. Bied indicates observations of this sort in his report to the Franco-Belgian "Association pour l'essai des Materiaux" (Association for Testing Materials) (1921).

In the manufacture of fused cements, the reactions must be quite rapid once the fusion has started. The formula .25 ($Si\ O_2\ 2\ CaO$) $+ Al_2\ O_3\ CaO$, when these are placed in contact, gives:

$$.25\ Si\ O_2 + Al_2\ O_3 + 1.5\ CaO$$

and the alumina must find itself in a relatively short time in the presence of 1.5 molecules of lime which it later gives to the silica.

In the manufacture of cements by incipient fusion, the reactions must be slower, because the molecules rubbing slowly against one another undergo a slow decomposition which better resembles a penetration one of the other, and this penetration is as much more difficult as the mixture has less "aptitude for burning," as M. Hendrickx has expressed it.

We have seen in the study of the silicates, that the silicates $\gamma Si\ O_2\ 2\ CaO$ obtained by slow cooling were unstable and pulverize spontaneously, and we have noted that in the presence of the aluminates, the same phenomenon is produced, while certain authors pretend that the presence of the alumina prevents this spontaneous pulverization.

Since all the silicates included between two and three molecules of lime show this phenomenon, what explanation is there that for cements burned in the fixed kiln, and therefore necessarily obtained by slow cooling that this spontaneous pulverization is not always encountered?

For the fused cements, the provision for drawing should be at the base. If the cement is drawn into a bin, the sudden cooling does not exist, and there is necessarily pulverization. If the drawing is done into canals, all depends on the dimensions whether there will be sudden or slow cooling, and, according to the particular case, there will or will not be pulverization. If the material drawn is granulated, the grains having undergone the cooling will necessarily remain stable and will not pulverize.

In any case, whatever may be the method of burning, at the moment when the mobility of the atomic groupings stops the materials of the clinker crystallize and, without taking account of the form of the crystals, we can represent schematically the crystallographic grouping as indicated in Fig. 12.

If we let the white crystals represent the crystals of $Si\ O_2\ 2\ CaO$, the black, the crystals of aluminate, and the cross-section crystals those of other formations, we notice that the two former surround the latter and imprison them in a more or less resistant mass.

A separate element of this mixture can be represented as indicated in Fig. 13, in which we will suppose that the white central portion represents a crystallization of $Si\ O_2\ 2\ CaO$ obtained by slow cooling.

The spontaneous pulverization of $Si\ O_2\ 2$

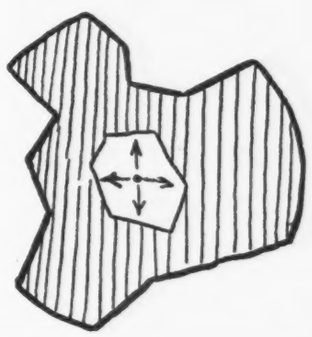


Fig. 13—Graphic representation of the way a bicalcic silicate crystal is surrounded

CaO is produced below 675°, therefore at a temperature at which the surrounding material $A\ 1_2\ O_3\ n\ CaO$, $Fe_2\ O_3\ n\ CaO$, etc., has already solidified. We can agree, therefore, that the mass of the surrounding material is sufficient to resist the pressure due to the changing volume of $\gamma Si\ O_2\ 2\ CaO$. There will, therefore, be compression in this silicate which, if the surrounding mass resists, will maintain the original volume and prevent the pulverization, assuring sufficient adhesion and cohesion.

In the contrary case, where the surrounding mass would be insufficient to withstand the pressure, there would be pulverization and a breaking down into larger or smaller particles of the surrounding material.

If the cement has been fused, the condition of crystallization is such that the particles of reduced aluminate are very fine and there is very little difference in the set and the strength from the parts spontaneously pulverized or remaining solid of the fused cement. If the cement was produced by incipient fusion in the burning, the crystallization is different from the foregoing; the broken down particles of the surrounding mass must be of larger dimension than the silicate powder. If the powder is screened at 4900 mesh (175 mesh) the fines consist almost wholly of $\gamma Si\ O_2\ 2\ CaO$, the set is slow and the strength low, because of the lack of cohesion and adhesion in the hydrated silicate of lime crystals. But if the mixture of powder and the mass remaining solid or in small particles is pulverized, then screened at 4900 (175 mesh) a very definite set and ample strength are observed.

Practically we have established these facts with blast furnace slags from Saut-du-Tarn, near Albi, in 1917, during a convalescence. These slags, which had not been granulated and which were pulverized by slow cooling, would set like good hydraulic limes, without the addition of lime before wetting. We know that lately M. Espinasse, director general of these factories has obtained in the manufacture of iron in the blast furnace, slags which act just like fused cements.

Conclusions on the Silicates and Aluminates of Lime

The mixtures of silica, alumina, and lime, fused or merely brought to incipient fusion, always give hydraulic materials, or products in which the silica and the alumina are subject to reaction in the presence of water and of setting more or less energetically in the presence of hydrate of lime.

According to the temperature of burning, the duration of the burning, and the method of cooling there are obtained products with different setting times and strengths, according as the silicates formed are included between $Si\ O_2\ 2\ CaO$, α, β and γ, and $Si\ O_2\ 3\ CaO$, and as the aluminates are included between $Al_2\ O_3\ CaO$ and $Al_2\ O_3\ 3\ CaO$.

The addition of hydrate of lime to a cement may produce a retarding or an acceleration of the set according to the quantities added and the nature of the aluminate contained or formed in the cement. The acceleration of the set stops as soon as the hydrated tricalcic aluminate is formed, and the retarding effect becomes noticeable only when the quantity of hydrated lime in excess in the cement or the hydration is sufficient to hinder the set of the aluminate of the cement.

The effects of hydrate of lime are more noticeable when it exists or is added in the pure state; they are slower if the hydrate of lime must come from the decomposition of a silicate, an aluminate, or from some other compound during hydration.

Special observations of the silicate and aluminate components, and of mixtures of silicates and aluminates, show the preponderating influence of the burning on the set and the hardening. We must admit, therefore, that the type of kiln adopted has an important influence on the method of manufacture and on the quality of the cement obtained.

As to the fundamental formulas, it is especially necessary to retain the maximum limits of lime; the lower limit should be determined for each combination of raw materials depending on the method of burning, temperature, and time and method of cooling. For the fused cements, it seems that the best results are obtained by using M. Bied's formula:

$x(Si\ O_2\ 2\ CaO)+y(Al_2\ O_3\ CaO)$ (*3)

and for the cements from incipient fusion by using M. Hendrickx's formula:

$x(Si\ O_2\ 2.5\ CaO)+y(Al_2\ O_3\ 3\ CaO)$

or by that which we recommend, very close to the last one:

$x(Si\ O_2\ 2\ CaO)+y(Al_2\ O_3\ 3\ CaO)$

with conditions of temperature, time of burning, and method of cooling variable according to the *aptitude a la cuisson* (aptitude for burning *4) of the raw materials at each factory.

(*3) The different brands on the market today are: "Ciment Fondu," obtained by the Water-Jacket, manufactured by Pavin de Lafarge; "Ciment Electro-fondu" is made by Pavin de Lafarge; "Cement Electrique" of M. Bied; "Electro-Ciment," made by *Les Forces Motrices de l'Agout*, at Luzieres, near Vabre (Tarn).

(*4) Author's footnote:—We have borrowed this term from M. Hendrickx; it expresses the thought better than the one we have adopted—*pouvoir affinitaire de cuisson* (affinity for burning).

Cement and Lime Industry of Esthonia

AS ESTHONIAN soil is particularly rich in lime and clay strata, the cement industry has unusually favorable conditions for development, and these have been enhanced by the opening of the oil-shale industry, which furnishes both cheap fuel and abundant raw material in the ashes left from burning. The foreign market promises to be a growing one, exports in 1922 trebling those of 1921 in quantity. Where Russia was the principal buyer before the war, the chief customers now are Latvia, the Scandinavian countries, and Germany. The home market is assured by the increasing amounts of construction work demanded in the Republic. There were nine factories in Esthonia in November, 1922, two of which had an output of portland cement in 1921 of about 20,000,000 kilos, and in 1922 of about 29,000,000 kilos; this compares with a pre-war output of 112,000,000 kilos. The number of workmen for the respective years was 670, 880, and 1,650.

The limestone of Esthonia in pre-war years was drawn on by Russia and by the home market for building purposes, tombstones, etc.; that quarried on the island of Oesel (Saaremaa) takes a good polish, and was used for many notable buildings in Petrograd. Of the 16 large and medium-sized and the 150 small lime and brick kilns of 1913-14, with an output of 50,000,000 bricks and 96,774 long tons of lime, all of the large and medium and a few of the smaller have resumed activity on a greatly reduced scale. Of the seven gypsum works before the war, only one remains, and that supplies the home market only. An Esthonian company was organized in 1922 to exploit the native phosphorite.—*U. S. Commerce Reports.*

Rock Products Producers Contribute for Air Service Landing Field

A LANDING circle, visible for five miles, has been erected at the local air service landing field at Mexico Farms, below this city (Cumberland, Md.) for the convenience of aviators wishing to land here. Material and labor were donated by the Enterprise Lime and Ballast Co., the Cumberland Cement and Supply Co., the Iron Sand and Gravel Co., S. T. Brotemarkle, J. Crites and H. Long.—*Cumberland (Md.) Times.*

Norwegian Portland Cement Manager Visits California

HANS HOLTER, sales manager of the Dalen Portland-Cementfabrik of Brevik, Norway, is a visitor in Los Angeles, Calif. He is quoted by the *Los Angeles Times* as follows:

"Our works were established in 1919 and we are now exporting cement to all parts of the world. We have an office in Buenos Aires, where a large amount of our product is used. Our foreign trade includes shipments to several of the countries of Europe, India, Java, South Africa and Australia, in addition to the business we do with the United States and Argentina."

He said his firm was able to meet the prices of American cement manufacturers at this time largely owing to the difference in exchange, the Norwegian krone being quoted at only a little more than half its normal value in American money at present.

"Another advantage possessed by the Norwegian manufacturer is the fact that his exports are transported entirely by water in Norwegian ships, our cement, for instance, being loaded on the boats where it is manufactured and carried to its destination without using rails at any stage of the trip," said Mr. Holter. "Our ships come to California for commodities produced here, such as fruits, and in order to carry a full cargo on the outbound trip they make a reduction in their transportation charges."

He said so far as labor costs are concerned, they are not as high as here, but the difference is not so great that this would enable the Norwegians to compete with the American manufacturer, if they were not favored by the exchange and the low transportation costs.

Operations of Kansas City Quarries Company

Quarries Which Are of More Than Local Interest from Their Connection with the Efforts of the Missouri Chief Highway Engineer to Force Lower Prices

By Edmund Shaw
Editor of Rock Products

THE quarries of Kansas City, Mo., and vicinity have become of more than local interest because they have been the subject of so much discussion in connection with the efforts of the chief highway engineer of Missouri to force the quarrymen to sell crushed stone at a lower price.

The Kansas City Quarries Co. is one of the largest producers of this district. It operates quarries at Rosedale and Leeds, which are small places just outside of Kansas City. Neither quarry produces a large tonnage, as tonnages go these days, because the ledges worked are not adapted to large tonnage production. But both plants are well built and equipped and both show considerably better management than is usually found in operations which produce 500 tons or less per day.

The Rosedale quarry is situated on a bluff or one side of a beautiful artificial lake which is one of the scenic features of that part of the country. The plant is on the quarry floor which is above the railroad track and the highway on which truck delivery is made. Advantage has been taken of the situation to set the bins on the ground and to provide a tunnel through which the various sizes of crushed stone are trammed to loading bins. This is a scheme for loading which is common in California and other western states but

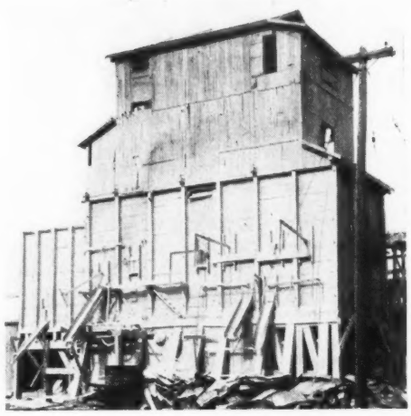
Plant at Rosedale; note tunnel leading from below the bins to loading hoppers at the right

is unusual in the East or Middle West.

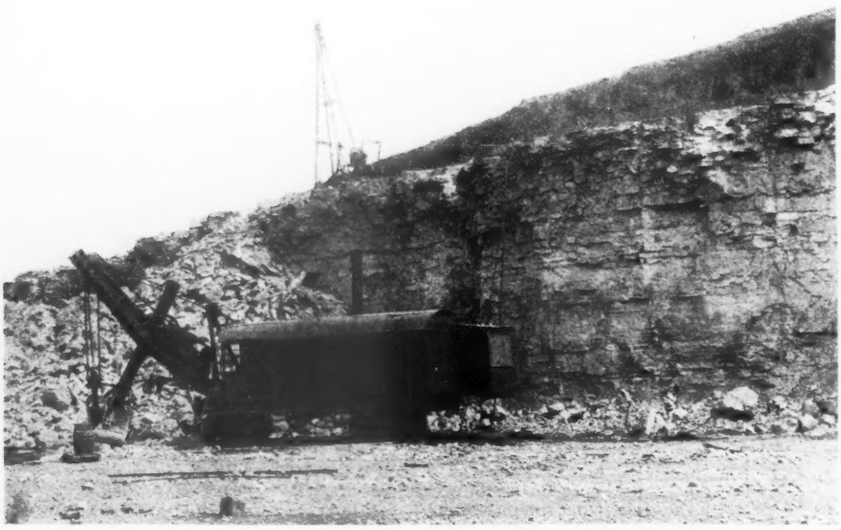
The Rosedale quarry face is about 800 ft. long and is 24 ft. high. A considerable amount of stripping has to be removed. The face is shot down by well-drill holes which are put down by a Sanderson-Cyclone drill, and the broken rock is loaded with a Bucyrus steam shovel.

The plant is of a type not unusual with operations of this size. The loaded cars are discharged directly to a primary crusher and elevated to a revolving screen. The oversize goes to a secondary crusher and the undersize to bins. The product of the secondary crusher is elevated to the screen by the same elevator that handles the primary crusher output.

In the Leeds quarry the procedure is somewhat different. The cars are loaded by hand and then pushed to a main line track and gathered into a train which is pulled by a dinky to a crushing plant about a quarter of a mile from the quarry. This plant is situated at an old quarry from which most of the stone has been taken.



Leeds plant of Kansas City Quarries Co.



Rosedale quarry; Bethany Falls ledge, the whole face of which is about 900 ft. long

The point about both these operations is the difficulty of producing material that will meet highway specifications, since the price to be paid for such material has been the point at issue between the producers of the Kansas City district and the chief highway engineer of Missouri, B. F. Piepmeier.

This difficulty comes from the character of the ledges which must be worked to produce crushed stone, since only a part of each ledge will make material which will pass the highway specifications.

The great limestone deposits of the Mississippi system, such as the Burlington, which are worked for both lime and limestone in the eastern part of Missouri, do not outcrop in the Kansas City district, but lie, according to one authority, about 750 ft. below the surface. The bluffs which are cut by the Missouri and Kaw rivers belong, according to a Missouri state geological report, to the Kansas City formation of the Pennsylvania system.

The Kansas City formation includes nine ledges, called Iola, Chanute, Drum, Cherryvale Winterset, Galesburg, Bethany Falls, Ladore and Hertha. None of these are of great depth and not all of them are limestone. The Galesburg and Lodore ledges, for example, which lie above and below the Bethany Falls limestone are shale ledges.

The ledges principally worked for crushed stone, of those noted, are the Iola, the Winterset and the Bethany Falls. Of these the Bethany Falls ledge is considered the most important by every crushed stone producer and quarryman with whom the writer has discussed the matter, since it is the only one which at all places has the hardness and toughness required by highway specifications. The upper part is nodular and somewhat broken and the lower part, in some places at least, has some shale, but between these is a workable stratum of clean hard limestone.

The Iola, Winterset, and Bethany Falls ledges are worked at these quarries. In the Rosedale quarry the Iola ledge forms the main working face and the ledge is worked as a unit. In the Leeds quarry the Winterset and Bethany Falls are worked as separate benches as is shown in the photograph. The Winterset ledge produces crushed stone which will serve for coarse aggregate for structural purposes and also railroad ballast and the like. The Bethany Falls ledge in both quarries can be relied upon for pro-

Leeds quarry; Bethany Falls ledge below; Winterset above. Worked in separate benches

ducing material that will pass highway specifications.

The working of these ledges demands considerably more care to the details of quarrying and crushing than has to be given at quarries in more favored situations for when highway material is produced it has to be sorted from the regular production. Every practical quarryman knows what that means in point of expense. It is figured that one-half the material quarried must be discarded to make highway material. With this in mind the original price of $1.65 asked by the Kansas City producers does not seem excessive. It is the same as asking $0.825 per ton for the whole quarry production, which is lower than crushed stone is quoted from any point included in ROCK PRODUCTS' market reports.

If the price asked for highway material in Kansas City seems high to the state highway engineer he certainly can not lay it to insufficient equipment or to inefficient operations. The terms "model plant" and "model operation" are so much used as to have lost much of their force, but there are no other terms which will express the impression left on the writer's mind by a visit to these plants. Everything showed a love of neatness and care and attention to detail. And these things are bound to be reflected advantageously in the production cost.

What Would You Do in a Case Like This?

LOOK at the picture herewith and figure what *you* would do under like circumstances! Rebuild with steel and concrete; that's what you would do. And that is just what the General Crushed Stone Co. is doing with its Akron (N. Y.) plant which was destroyed by lightning and fire on June 21.

We have the following statement from Otho M. Graves, assistant to the president of the General Crushed Stone Co.:

"The main crushing plant at Akron, which is about 22 miles east of Buffalo, on the West Shore railroad, was struck by lightning at 1:30 a. m. June 21. This occurred in the midst of one of the worst storms ever experienced in that section of the country and the telephone wires were put out of commission at the same time, so that it was impossible for the watchman to call for assistance to put out the fire, which immediately followed the stroke of lightning.

"The plant was totally destroyed by fire, the frame and wood construction burning rapidly. This applies only to the main crusher building, as the Amiesite plant, the machine shops and a large steel building housing the Edison rolls were unharmed. The crushers were all Allis-Chalmers and the two No. 10's, the No. 8 and one No. 6 remained on their concrete fundations, but the foundations of two 6's collapsed, causing them to overturn. The crushers seem to be damaged hardly any, and we further believe that a considerable amount of salvage can be obtained from the bucket elevators and screens.

"We are proceeding with plans to rebuild the plant, which is being designed jointly by us and the Lehigh Structural Steel Co. of Allentown."

McMyler Interstate Company Acquires Industrial Works

THE McMyler Interstate Co., Cleveland, has completed negotiations for the purchase of the Industrial Works, Bay City, Mich., subject to the approval of the stockholders of both companies. A special meeting of the stockholders of the former company will be held Aug. 22 to secure ratification of the agreements and to approve new financing plans. The name of the McMyler company will be changed to the North American Equipment Co., and the present capital structure will be readjusted to meet the demands of the enlarged company. Stockholders will be asked to approve an increase in the capital stock from 30,000 to 250,000 shares of no par stock. The McMyler Interstate Co. manufactures locomotive and other types of cranes, car dumpers and other handling equipment. The Industrial Works is the leading manufacturer of railroad wrecking cranes and also manufactures locomotive cranes. The Bay City plant will be kept in operation as a unit of the new company. Negotiations are under way also for the purchase of a large Eastern company.—*Iron Age.*

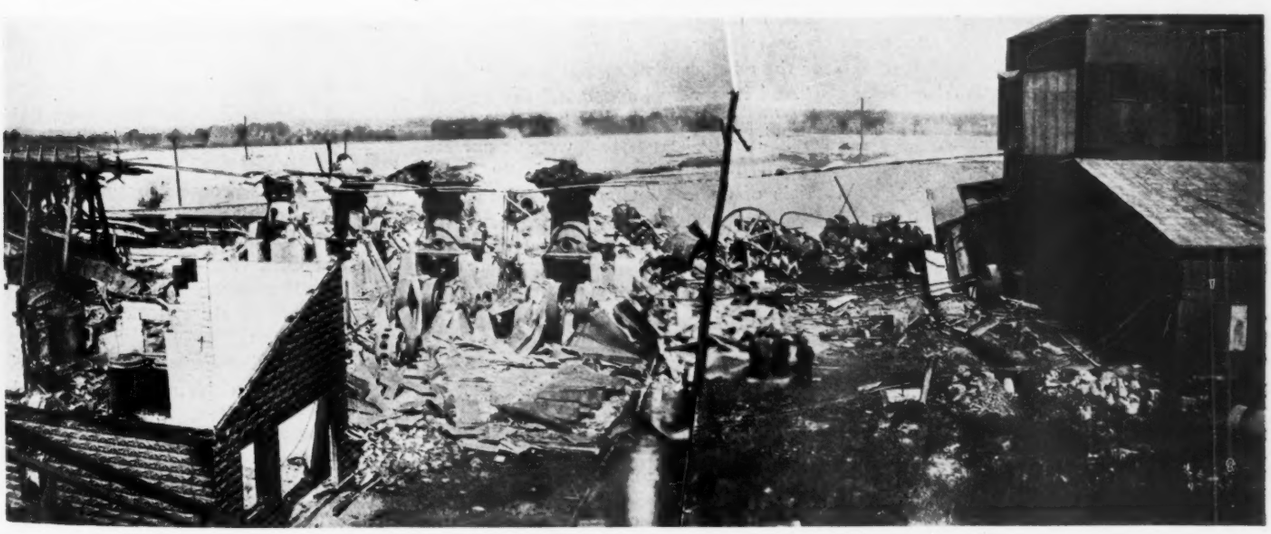
Charles Warner Company Expands

THE CHARLES WARNER CO., Wilmington, Del., has acquired the plant of the Penn Sand and Gravel Co., on the Delaware river, vicinity of Tullytown, Penn. Extensions will be made in the Penn plant, which will be operated in conjunction with the large mining, handling and shipping plant now being installed at Tullytown. It is expected to have machinery placed for operations in October. Plans for the new plant were described in ROCK PRODUCTS, May 3, 1924.

Midwest Quarries Company's New Plant Ready

THE BIG PLANT of the Midwest Quarries Co., at Greencastle, Ind., which has been under construction for the last six months as a result of the original plant being destroyed by fire, is ready to resume operation, according to E. B. Taylor, superintendent of the plant.

The new Greencastle plant is one of the most modern in the Middle West. It will have a minimum capacity of 250 tons of stone an hour and may run as high as 400 tons an hour. As soon as operations are begun the force of employes will be increased and it is planned to operate at capacity until a large volume of back orders has been filled.



View of the ruins of the Akron plant of the General Crushed Stone Co.

Must Want Good Prices for This Quarry Equipment!

THE municipal government is cleaning house this week. All equipment of the Kirschmann quarry on the side of Mount Penn, the cages and other movable property at the former zoo and all other junk, useless and worn out material owned by the city will be put on the auction block on Friday, Councilman Fred G. Hodges, superintendent of parks and public property, announced recently.

The sale of the equipment of the Kirschmann quarry is the first step taken by the city in preparing the site for relandscaping and restoration of the beauty of the mountainside. Although no announcement has been made, the city will probably develop a plan for planting the great hole in the mountainside with shrubs and trees to hide the disfiguration, as suggested by the Berks Conservation Society.

The Kostenbader quarry, of which the city is now endeavoring to gain control, may also come into the city's possession within a short time. John A. Keppelman, attorney for A. F. Kostenbader, owner of the quarry, and the Reading Sand and Stone Co., lessees, announced recently that the case is now in process of settlement.—*Reading (Penn.) Tribune.*

Typical municipal enterprize, what you say!

New Chief of Highway Research

CHAS. M. UPHAM, state highway engineer of North Carolina, has been recently appointed director of the Advisory Board on Highway Research of the National Research Council, to succeed Dr. W. K. Hatt who resigned in order to resume his work at Purdue University.

The present board intends to continue the excellent plans already effected and to extend its activities so that the results of highway research may be practically applied by the states and counties carrying on programs of highway construction and maintenance and by others interested in highways. The organization has been extended so that each State Highway Department may have a representative on the board who will serve as a point of contact between it and the State. It is also planned to have similar representation from Universities engaged in highway research.

Mr. Upham, the new director, has had extensive experience in highway work. He received his early training with the Massachusetts Highway Department and later became chief engineer of the Coleman du Pont Road. Following this he was, for four years, chief engineer of the Delaware State Highway Department when he was called to take charge of the extensive highway construction program in North Carolina. Mr. Upham holds a B.S. degree from Tufts College and an honorary C.E. degree from the University of North Carolina. He is an associate member of the American Society of Civil Engineers and holds active membership in many other Technical Societies. For the past two years he has been business director of the American Road Builder's Association and has been re-elected several times to his present position as secretary of the American Association of State Highway Officials.

It is expected that Mr. Upham's wide acquaintance and broad experience in the highway field will make his connection as director of the Advisory Board on Highway Research especially valuable to those agencies which can utilize the information being made available by this organization.

The offices of the board are now located in the new and imposing building of the National Research Council at B and 21st Streets, Washington, D. C.

Quarry Industry in Big City Newspaper

WE NOTE with interest and pleasure a full-page story, "With Reporter and Photographer at the Quarry," in the *Columbus (Ohio) Dispatch* of July 13. The quarry referred to is that of the Marble Cliff Quarries Co., just outside of Columbus. A group of 10 views accompanies the article, which is quite attractively gotten up. It is gratifying to know that even newspaper reporters are beginning to discover that the quarry industry is a real industry.

Extracts from the newspaper story are as follows:

"The production of limestone derivatives is one of the greatest industries in America," asserted H. R. Welch, general superintendent of Marble Cliff quarries, as he sat recently in his office in the center of hundreds of acres of artificial mountains and valleys and watched distant explosions of dynamite break loose the rock to be run through a thousand processes for the advancement of mankind.

"And it is very important," the general superintendent continued, "as civilization would hardly be possible were it not for the aid of limestone. Practically every article of commerce has required the use of limestone in its manufacture. For instance, the straw in your straw hat has been run through a solution of limewater and steam to make it pliable. Fluxes made of limestone and added to the compound with which plate glass is made, blends with the other materials and makes it possible to bend, roll and figure the glass.

"The essential ingredient of baking and washing sodas, enabling us to lighten the loaf eaten by primitive man and to clean our clothes, is limestone. The road beds over which modern civilization travels requires a large amount of limestone. Limestone slag from the glass making process is utilized in the manufacture of cement. And we can go on with the list until almost every article with which you come in contact can be enumerated."

Mr. Welch watched a little production indicator attentively for a few minutes. The little indicator in his office records the production as the limestone goes through the mills scattered about the great Marble Cliff quarries. The indicator shows that these quarries are among the largest of the world. What it can not show is that the quality of limestone produced is of the highest and that the quarries constitute one of the greatest manufacturing centers in the vicinity of Columbus.

Chairman Gary of the Missouri Highway Commission Hits Back at Producers

THEODORE GARY, chairman of the state highway commission, recently ridiculed the attack made on the commission by the National Sand and Gravel Association through its official publication, *The Bulletin*, in the current issue.

The magazine scored the highway commissioners for closing the 20 cent a ton contract for 100,000 tons of the material with the Woods Brothers Corporation for use in construction of highways.

Mr. Gary said the commercial sand companies had been criticising the commission for some time.

"They are interested in the welfare of the 7,640-mile program for the state only from the standpoint of selling sand to us at a high price," he added.

"This attack is the best kind of advertising we can get for it shows we are doing all in our power to obtain the greatest amount of good material at the least possible cost."

The magazine charged the sand ultimately would cost more than the commercial producers asked. It alleged that the "20 cent sand contract" would cost the state hundreds of thousands of dollars.

To refute this assertion, Mr. Gary called in B. H. Piepmeier, chief engineer for the commission. Mr. Piepmeier said the sand will cost the state 43.7 cents when delivered to various sections for projects now under construction.

The engineer divided the 43.7 cents into the following portions: sand, 20 cents; loading contract, 15 cents; freight, 5 cents; state royalties, 1.2 cents; railroad siding, 2½ cents.

Mr. Piepmeier estimated the Woods contract will save the state approximately $30,000 on its sand bill.—*Kansas City (Mo.) Journal.*

Another Kansas City newspaper carries extracts from ROCK PRODUCTS' denunciation of this sand contract—without comment.

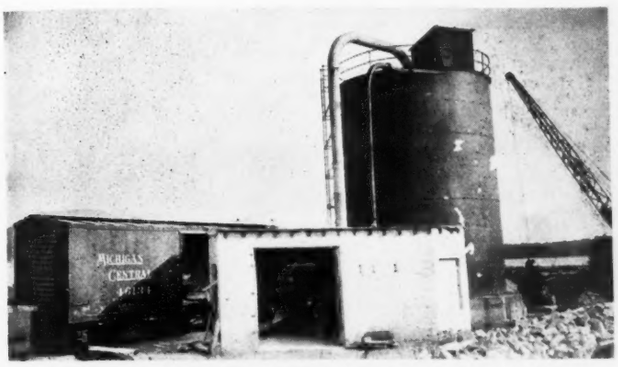
Detroit Sand-Lime Brick Manufacturer Constructs Unique Pulverizing Plant

Manufactures Sand-Lime Brick of Wet Lake Sand and Pulverized Quick Lime

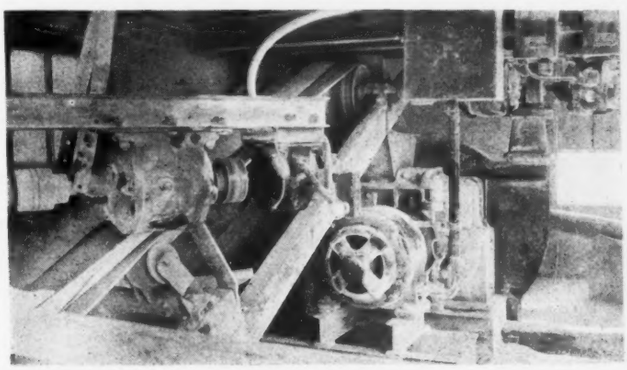
THE Sand-Lime Products Co. of Detroit, Mich., manufacturers of sand-lime brick, has developed a new process for making sand-lime brick which makes it unnecessary to operate a lime hydrator. In the past this lime was fed from the cars into a paddle type hydrator and was stored as hydrated lime until ready for use.

The company obtains sand by boat. It is pumped from the bottom of Lake St. Clair, and being wet it has always been necessary to partly dry it, for which purpose a rotary sand dryer was installed.

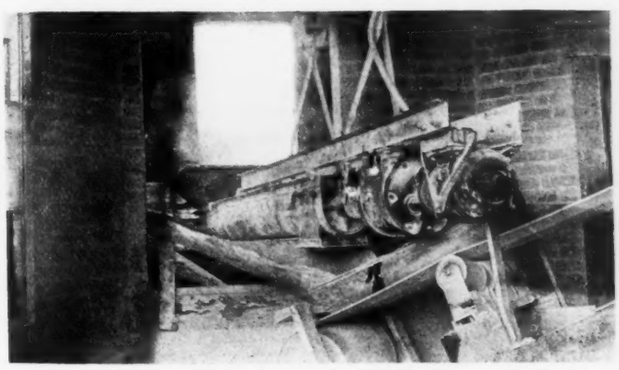
It having appeared bad engineering to the management of the Sand-Lime Products Co. to add water to one ingredient of their product while having to go to considerable expense to remove the water from the other ingredient, it was decided to experiment with a new process by which the quick lime would be used to dry the sand while itself becoming hydrated. The company is now successfully making brick by this method. It merely mixes pulverized quick lime with the wet lake sand. The lime becomes hydrated and the mixture is sufficiently dry for brick making.



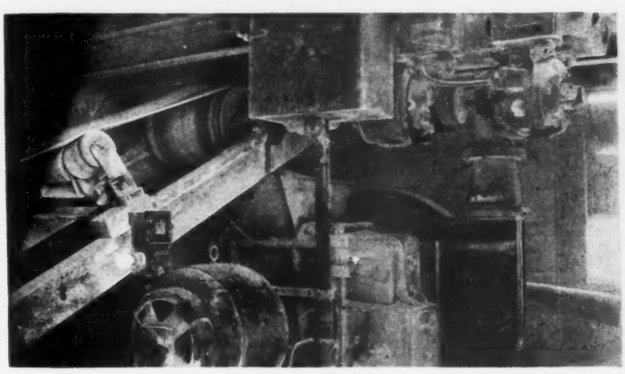
Entire pulverizing plant; shows freight car being unloaded; steel storage bin is 20 ft. in diameter by 28 ft. high



Inside of pulverizing building; motor direct-connected to pulverizer; magnetic pulley above; portable screw conveyor and motor



Looking into car of lime; shows portable screw feeder with reduction gear and motor from overhead trolley



Close-up of pulverizer, blower and driving motor, enclosed switch, starters and push-buttons for all three motors

Pulverizing and Storing Quick Lime

This change in process necessitated the construction of a pulverizing plant to pulverize the quick lime as removed from the cars. The company now stores pulverized quick lime.

The pulverizing plant consists of an air-tight steel storage bin of 250 tons capacity, a hammer mill pulverizer (Sturtevant Mill Co.), a blower (Buffalo Forge Co.), a magnetic separator (Dings), a screw feeder (Stephens-Adamson) and a dust collector (Sly). The Sly dust collector is located on top of the steel storage bin and is not provided with the usual hopper under the screen. The storage bin itself is the hopper. Plugging of the screen would not affect the operation of the plant but would merely increase the amount of dust in the pulverizer building. Lime is shoveled by hand from the car into the hopper of a screw conveyor. The screw feeder from the car has a tapering section of screw at the feeding end. The hopper is adjustable lengthwise, making it possible to increase or decrease the feed by the use of a larger or smaller diameter of screw. This discharges on an inclined belt conveyor, the head pulley of which is a magnetic pulley designed to remove all

tramp iron before the lime passes into the pulverizer.

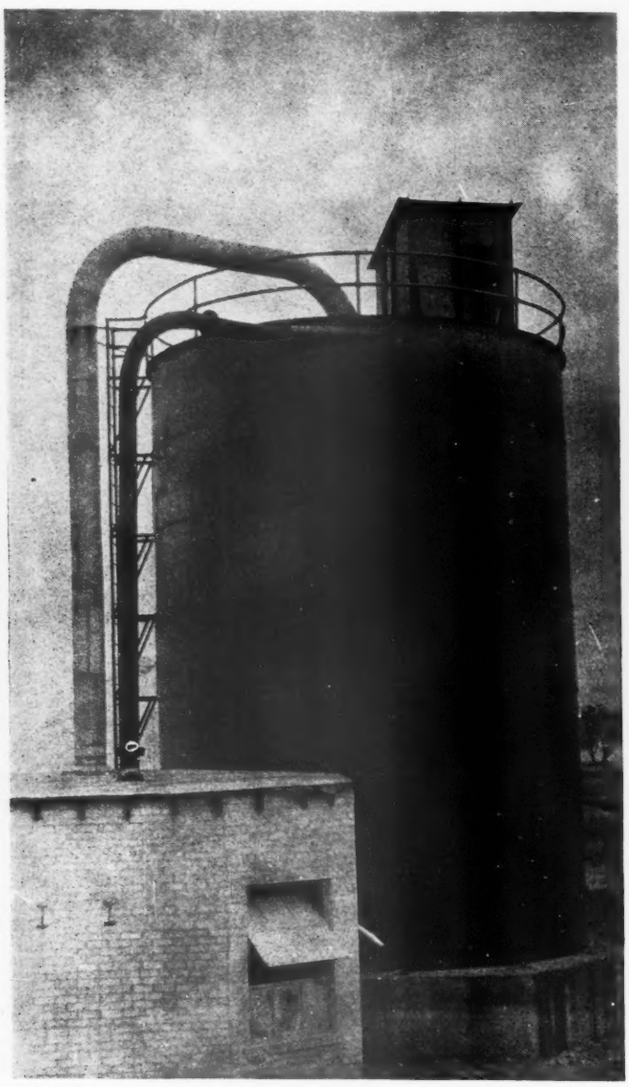
A chamber under the pulverizer is provided with a series of trays or shelves arranged like stair treads. Most of the lime from the pulverizer drops on the top shelf. A high pressure centrifugal blower sucks air between and over and under the various shelves. The lime is caused to fall from shelf to shelf and as it does so it is picked up by the air currents and carried into the blower, and from the latter is blown tangentially into the top of the steel storage bin. A unique feature is the arrangement of trays or shelves under the pulverizer, which gives the air several chances to pick up the lime as it falls. The trays are staggered so that the forward edges act like stair treads and any lime which continues to fall, in spite of the air currents, is sure to be picked up before it reaches the bottom. The whirl in the top of the round bin throws out the lime which is heavier than air. The air, partially at least, free from lime travels toward the center of the top of the bin. From this point a large pipe returns the air to a compartment under the pulverizer and the cycle is repeated. The same air keeps traveling around the cycle picking up lime at the pulverizer and discharging it in the bin.

To prevent dust in the pulverizer building some air is drawn into the system through the pulverizer hopper. This same amount of air is allowed to escape through a canvas dust collector located on top of the lime bin.

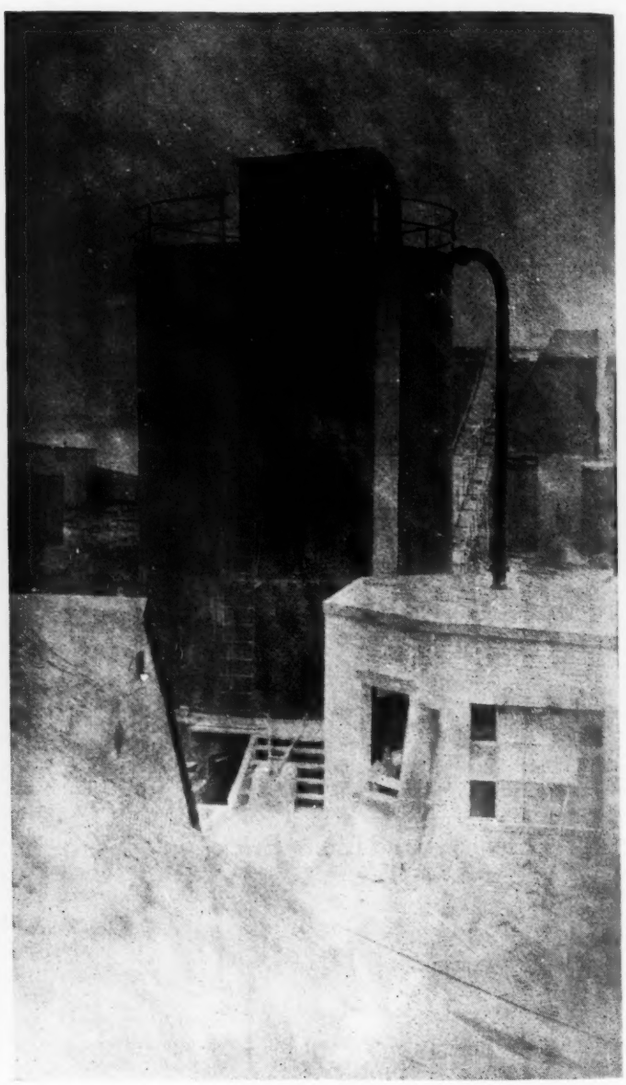
The sketch shows the scheme of reclaiming the lime dust and separating it from the air. The arrows show the direction of flow of air and dust. The dust is carried upward through a pipe and discharged at the rim of the bin. The air is taken off from the center of the bin by the large pipe and carried back to the grids under the pulverizer. The system will operate as a closed system without the use of any dust collector. The dust collector is added to keep down dust in the pulverizer building. Some air is allowed to escape through the dust collector and a corresponding amount is taken into the system through leakage into the pulverizer in the pulverizer building. Most of this air goes into the pulverizer hopper with the lime. A hood is built up close to the pulley to reduce as much as possible the flow of air into the pulverizer and to prevent dust working back out of the machine.

The fan wheel is mounted on the end of the pulverizer shaft, taking the place of one flywheel. The motor is direct connected to the other end of the pulverizer shaft. The magnetic head pulley is driven by a separate motor through a Jones reduction gear set completely enclosed and running in oil. The screw feeder is likewise driven by a separate motor through a Jones reduction gear set. This feeder unit is portable, operating on a trolley so that it can be run out of the pulverizer building into the car.

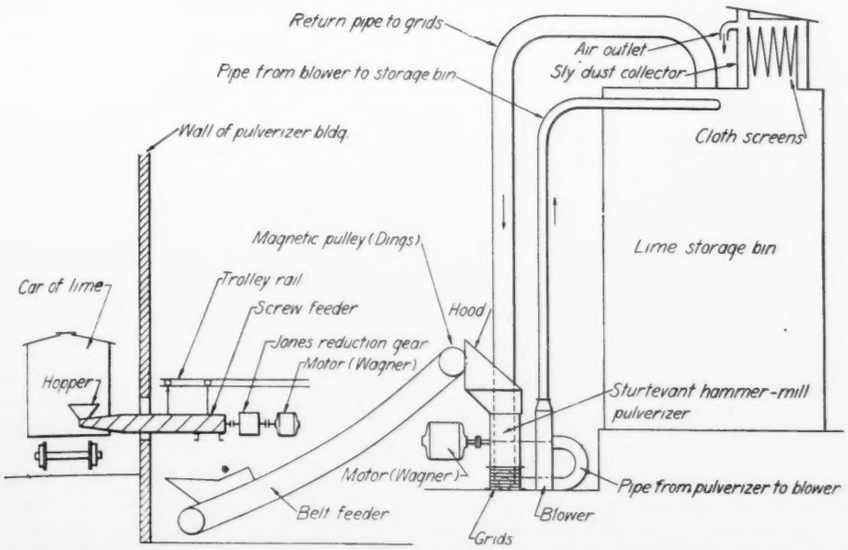
The three motors used in this plant were furnished by the Wagner Electric



Steel storage bins and dust collector and piping



Another view of bin showing tunnel below for removing lime



Sketch (not to scale) showing details of lime handling, pulverizing and dust-collecting apparatus at the plant of the Sand-Lime Products Co., Detroit, Mich.

Co. Each is provided with an automatic controller made by the Industrial Controller Co. No fuses are required, each controller being equipped with overload and no load relays. The controllers are connected up so that the motors must be started up and stopped in the proper order. It is impossible for the feeder motors to operate when the pulverizer motor is not running.

The entire pulverizing plant is constructed of steel, concrete and brick. Wiring is in conduit.

For the information, views and data contained in this article we are indebted to Theron C. Taylor, president of the Sand Lime Products Co. H. Lester Kotting is vice-president and secretary; Louis H. Turrell is treasurer.

New Orleans Sand-Lime Brick Get Official O. K.

ONE New Orleans product has won its fight for full government O. K. recently. After sustaining a long examination before the United States Bureau of Standards as to its durability, utility and soundness as a manufactured material for building and general construction purposes, "Everstone" brick, manufactured by the American Brick Co., of New Orleans, of which Otto Schwartz is president, has received official government sanction and is recommended by the government as a satisfactory product.

Everstone brick is a sand-lime brick, a product which for years has been successfully used in Europe and which has been manufactured largely in Germany, but there has been disposition in this country to insist on its lesser utility as compared to clay brick. Steady growth of the use of sand-lime brick in some of the highest and finest buildings of the United States resulted in a renewed demand for action by the U. S. Bureau of Standards.

Announcement is made that sand-lime brick will be accepted as a satisfactory, common building brick for government buildings in the future. Many structures in New Orleans have been constructed of the material within the past year and a half and a considerable number are now going up. Among those recently built in the section adjacent to the center of the city is the lighthouse for the blind on Camp street.

Official notification to the American Brick Co., of New Orleans, whose factory is on the New Basin Canal at Murat street, is contained in a letter to the company, through President Schwartz, from George K. Burgess, director of the Bureau of Standards in the department of commerce, in which he says in part:

"The American Society for Testing Materials' published specifications for building brick require that a brick which is to be used for certain purposes shall have certain properties as to strength and absorption.

"The above specifications have been endorsed by this bureau in a publication on sand-lime brick, a copy of which is enclosed herewith.

"The building code committee of the department of commerce has also taken the position that there shall be no distinction between clay brick and sand-lime brick as long as the bricks which are compared have the same properties.

"The supervising architect's office of the treasury department state that it has no prejudice in favor of clay brick as against sand-lime brick."—*New Orleans (La.) Item.*

Cement Company Building Workmen's Homes

THE Clinchfield Portland Cement Corp. of Kingsport, Tenn., erecting a large cement plant near Macon, Ga., have purchased 21 acres of land in the eastern portion of the town. They are having the tract surveyed and laid off in building lots. They will soon begin work preparatory toward the erection of about 40 dwellings on this property for employes of the company.—*Macon (Ga.) Telegram.*

Expansion of Flint Aggregate Held Responsible for Buckling Concrete Pavement

THE terrific heat Wednesday caused an upheaval in the pavement of the Fort-to-Fort highway in the vicinity of Six Corners (Kans.), it was reported to the county engineer's office at Topeko.

A hole approximately 18 ft. square was blown in the concrete pavement. This is the second time the pavement has buckled because of heat, it was pointed out. Engineers assign the use of flint rock as the reason. Where native limestone was used, the pavement withstood expansion, it was pointed out.—*Topeka (Kans.) Capital.*

Investigation Will Determine Effect of Dust in Concrete

THE common occurrence of a coating or film of wet dust on stone, which has been quarried and crushed during a rainy period, has led the Illinois bureau of materials to investigate the permissible amount of this dust which may be present without causing retrogression of strength or excessive scaling on concrete in which such material has been used.

Specimens have been prepared using in the mix percentages of stone dust from 0 to 8% by weight of coarse aggregate. To provide a suitable dust film the crushed stone is placed in an open mixer with only sufficient water to thoroughly wet the surfaces. The proper amount of dust is then added and the mixer operated until an even coating is obtained on the stone. The sand and cement are then added and mixed for 1 minute after which the proper amount of water is incorporated.

Observations in this experiment to determine the effect of dust will include examination of the surfaces of the specimen as well as strength tests at various ages.

Sand Lime Brick in Canada

THE production of sand lime brick is on the increase. The following preliminary figures indicate the growing production of this brick in Canada according to a ROCK PRODUCTS correspondent:

1922	49,000,000
1923	62,000,000

The common clay brick figures show a decrease due probably to a permanent increase in price. The figures for common brick in Canada are as follows from the same source:

1922	105,500,000
1923	88,000,000

Free Lime Gives Gypsum Plaster Special Properties

German Experience with Estrich Gypsum or Flooring Plasters

LIME and calcined gypsum are perhaps the two most competitive commodities in the rock products industries, because either one fills a very common need for an interior plaster or stucco. As exterior plasters or stuccos both have been far outdistanced in this country by portland cement and magnesia (oxychloride) cements.

Lime manufacturers rather hesitate to admit that the addition of a small percentage of gypsum may be the most feasible method of making a quick-setting lime plaster; and gypsum manufacturers are equally reluctant to admit that the addition of lime improves gypsum plaster—yet both these mixtures are made evidently with profitable results.

In any event, the more we learn of the chemistry of lime and gypsum the more we see that the two materials dove-tail and the more intimate their relations appear. Future discoveries may actually lead to close co-operation of these present rather fierce competitors.

Now comes a German experimenter who states positively that the special properties of Estrich gypsum or flooring plaster are due to the inclusion of 2 to 5% of free lime. According to P. P. Budinkov, the German authority: "Estrich gypsum or flooring plaster is prepared by heating gypsum above 800 deg. C. Dissociation of $CaSO_4$ begins at 750-800 deg. Free CaO can be distinguished under the microscope and freshly ignited gypsum has alkaline reaction. The presence of free CaO gives flooring plaster its special properties. This is confirmed by adding 2 to 5% CaO to plaster of Paris; the product is similar to flooring plaster. Gypsum was heated to constant weight at 1000 deg., 1100 deg., 1200 deg. and 1300 deg. C. Setting was not improved by heating above 1000 deg. C."

If the above is true it settles a number of previous hazy conceptions of the reasons for the special properties of German flooring or hard-finish gypsums.

Gypsum for Outside Stucco

The Estrich gypsum product is a hydraulic cement, much used in ancient Europe and Asia for masonry mortar and outside stucco, and still extensively employed for these purposes in Germany and other European countries.

The best description of hydraulic gypsum cement of the kind used so much in Germany, is given by Dr. Frank A. Wilder, president of the Southern Gypsum Co., North Holston, Va., in his recent "Gypsum: Its Occurrence, Origin Technology and Uses," published by the Iowa Geological Survey, 1923. We quote from Dr. Wilder as follows:

Hydraulic Gypsum Cement

"In Germany the term Estrich (which means flooring) is applied to gypsums calcined at the temperature at which partial oxidation takes place (1652 deg. F or 900 deg. C.), because it posseses properties which make it peculiarly valuable for flooring purposes.

"The term hydraulic gypsum has been used to describe this product, and inasmuch as it correctly describes one of its important attributes and is free from confusing associations it is recommended for use in this connection.

"Hydraulic gypsum is calcined by heating lump gypsum in an oxydizing flame to a temperature of 900 deg. C. to 1300 deg. C. The gypsum between these temperatures is at red heat. Higher temperatures are in no way harmful and produce a somewhat a better product. * * * Tests show that the minimum furnace temperature required is about 900 deg. C. When burned at higher temperatures the gypsum sets harder and more quickly.

"Anhydrite may be successfully used as a raw material provided the temperature is sufficiently high (1400 deg. C. and above).

"Next to the proper temperature required for burning hydraulic gypsum, it is necessary to burn it under oxidizing conditions. In other words, the heat must be applied in such a way that during the later stages of the burning process, an excess of free oxygen is present. Some of this oxygen will, at the high temperature prevailing, combine with a portion of the sulphur present as calcium sulphate ($CaSO_4$) and go off with the furnace gases as SO_2. There will be left in consequence a certain amount of calcium oxide (CaO) ranging from 4 to 10%."

In Germany shaft kilns very similar to the ordinary lime kiln are used to calcine the gypsum rock. The red-hot rock is drawn at intervals, and thoroughly exposed to the oxygen of the air. The drawing operation of the kiln may be either intermittent or continuous, according to the type of kiln used. A rotary kiln could, of course, be used.

Dr. Wilder states: "After burning hydraulic gypsum is coarsely ground as it gives the best results when only a small percentage of the whole passes a 100-mesh sieve." We presume the reason for this is that the addition of water hydrates the free lime and breaks up the particles finer than they could be ground.

These hydraulic gypsums are different from Keene's cement and other "dead-burned" gypsum cements manufactured in this country, since the latter are made by additions of alum, borax, or some other ingredient. The chemistry of their setting must be quite different.

Building Material Imports

"APPARENTLY only the building investors have sensed the significance of the increasing volume of imported basic materials in New York and other seaboard cities," says a recent *Dow Service Building Report*. "Some basic building material manufacturers have investigated the situation and those who have done so and have at the same time studied the long and costly fight the glass industry has fought against a movement that at first they considered too trivial to pay much attention to, have discovered a reason why building is on the wane.

"Importation of brick through New York City so far this year totals 18,891,000 up to May. Cement importations through this city totalled 3186 bbl. or at the rate of approximately 19,000 bbl. a year as against 15,936 bbl. in 1923 and only 5736 bbl. in 1922. Imports of cement for the country in the first four months gained 300% over the same four months last year, according to official government figures.

"There is now under way a project to import finishing lime through New York from Europe. Window and plate glass manufacturers have fought a hard and costly fight for dominance of the New York market against glass importers but even today the United States Government reports imports of foreign made glass to have risen in the last two years from 3,000,0000 sq. ft. to 26,0000,000 sq. ft.

"Domestic building material representatives talk of turning their sales efforts Westward until New York finds itself short of supplies again and American price scales for basic materials are restored here but it is quite evident that the Eastern basic building material distributor is not quite so complacent about the security of his market as he was a year ago."

Producers Can Help Avoid Open-Top Car Shortages

Recommendations of the Storage of Coal Committee of the American Engineering Council

IF THERE is any one thing that is responsible for putting a crimp in construction activity it is the periodical open-top car shortages. Producers of mineral aggregates know this full well, but perhaps producers of cement, lime and gypsum do not realize its ultimate effect on their production. But since these latter rock products industries are large users of coal, they are in a better position to help prevent these open-top car shortages, than the producers of aggregates.

This year coal production and shipments are falling way below what they should, if we are going to have a fall and winter business any where near normal. If business is normal there is going to be a shortage of coal and a transportation jam, and a pronounced shortage of open-top cars, which will seriously interfere with the production of rock products.

Danger of coal famine will be eliminated, industry stabilized, railroads relieved and the consumer's coal bill ultimately cut by seasonal storage of coal, it is asserted in the report of the Storage of Coal Committee of the American Engineering Council made public recently.

"The storage of coal," the report declares, "is essentially necessary as an aid to the solution of the national coal problem, and is an economic and practicable means of insuring an adequate supply of coal as needed.

"If each coal consumer will adopt the policy of annually purchasing coal on a uniform monthly delivery basis, there will result automatically sufficient seasonal storage to guarantee coal to the consumer, as needed. Furthermore, this policy will bring about a uniform demand for coal whereby the coal producer and carrier may establish uniform and standard production and shipment schedules.

"It will also remove the evils of intermittent operation of coal mines, frequent panicky market conditions, and coal shortages due to inability of the carriers to meet peak demands."

Seasonal storage of coal by consumers, the committee finds is an economic and practical means of insuring an adequate supply and satisfactory quality of coal when needed. "The irregularity in coal production," the report continues, "is largely due to seasonal demand. Since more coal is consumed in the late fall and in the winter than at other periods, coal producers and carriers each year are confronted alternately with a feast and a famine—with an inordinate demand for coal and transportation followed by a period of no demand. This seasonal demand is responsible for 47% of the idle time of the coal industry.

"Seasonal demand also contributes to another very disturbing element, namely, the over-development of mine capacity through opening too many mines. Coal production capacity is now twice as large as the consumption capacity. The two factors—intermittent or seasonal operation and over-development—are in a very large measure responsible for the ills of the coal industry."

The report, given out by ex-Governor James Hartness of Vermont, president of the American Engineering Council, comprises about 110,000 words. It was prepared by a main Committee of the Council, headed by W. L. Abbott of Chicago, working with the Department of Commerce, the U. S. Coal Commission, and federal, state and municipal agencies as well as private enterprise.

Economies of Coal Storage

"The amount of storage required to produce these corrective and constructive results," the Committee declares in summarizing its conclusions, "is small in terms of the per cent of annual consumption. For seasonal storage, from 9% to 10% of the annual consumption is all that is required. If this amount is supplemented by additional reserve storage of no more than 7%, there will result an accumulation of some 83,000,000 tons of coal in storage by September 30 of each year. The practicability of this amount of storage with but slight additional outlay for equipment is indicated by the fact that on September, 1923, 56,000,000 tons were in storage.

"Equipment has been developed and may be secured to meet any storage situation or requirement. The cost of such equipment ranges from a few cents per ton of capacity up to $2.50 or $3.00 per ton of capacity.

"Storage of coal presents no serious risk of loss from breakage, spontaneous combustion, or loss of heat value or firing qualities. All kinds of coal have been and may be successfully stored. The insignificant money loss due to the factors named above should not deter any one from storing coal. Application of the simple and inexpensive regulations and practices set forth in this report will provide all reasonable safeguards against such possible losses.

"The cost of storage per ton, including fixed charges on equipment, maintenance and operation expense and interest on investment in coal as well as taxes and insurance, in most instances does not exceed 75c per ton yearly. More generally it is around 50c per ton yearly. This cost is insignificant when distributed over annual consumption.

"Storing of coal may be easily financed. Banks will finance such an investment as readily as any other commercial undertaking.

"The transportation facilities of the United States are adequate normal and regular movement of coal. For short periods the railways can move coal at an abnormal rate, but this is both expensive and detrimental to shipment or other commodities and to normal freight movement.

"To increase transportation facilities to meet the peak demands resulting from the prevailing unsystematic practice in coal shipment would require an additional investment of some $12,000,000,000. Such an investment is not justified.

"Cars should be assigned to mines upon the basis of coal actually sold and not upon rated capacity of production. This measure would be a wholesome deterrent to over-development of coal producing facilities.

"Contracts for coal should be observed with fidelity. The evil practice of indiscriminate breaking of coal contracts has seriously injured the American coal industry with reference alike to production, transportation and consumption. Contracts for coal should be observed with the same good faith as universally prevails in regard to other forms of commercial contracts."

Purchase on Yearly Contract with Uniform Monthly Deliveries

The committee recommends that all coal consumers purchase their coal on an annual contract for yearly requirements with a provision that the coal be delivered monthly in equal allotments. It urges that consumers provide necessary storage facilities to meet the terms of such contract.

"These recommendations," the report points out, "are based upon the finding that the purchase of coal upon a uniform monthly delivery basis will result in a condition whereby coal mines may inaugurate and maintain a regular production schedule; carriers may plan definitely as regards both schedules and equipment for a uniform movement of coal; stocks of coal automatically will accumulate during the months from April to September inclusive in sufficient amount to meet the extra consumption during the winter months; a reduction in the price of coal will be made possible by more regular schedules of production and transportation and by elimination of peak demands in the winter months when the costs of both production and transportation are the highest."

Union Rock Company's Model Plant

All Concrete and Steel with Special Provision for Wash Water Supply

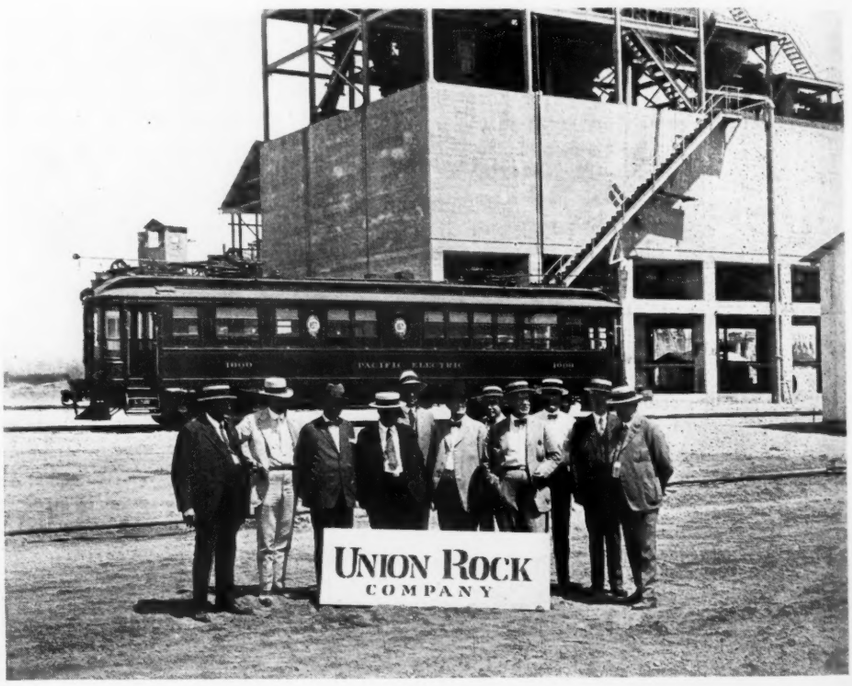
By R. V. Leeson
Vice-President and Chief Engineer, Wheeler Company, Los Angeles, Calif.

THE opening of the sixth rock, sand and gravel plant owned and operated by the Union Rock Co. of Los Angeles, Calif., was celebrated recently at the new plant near Baldwin Park, Calif.

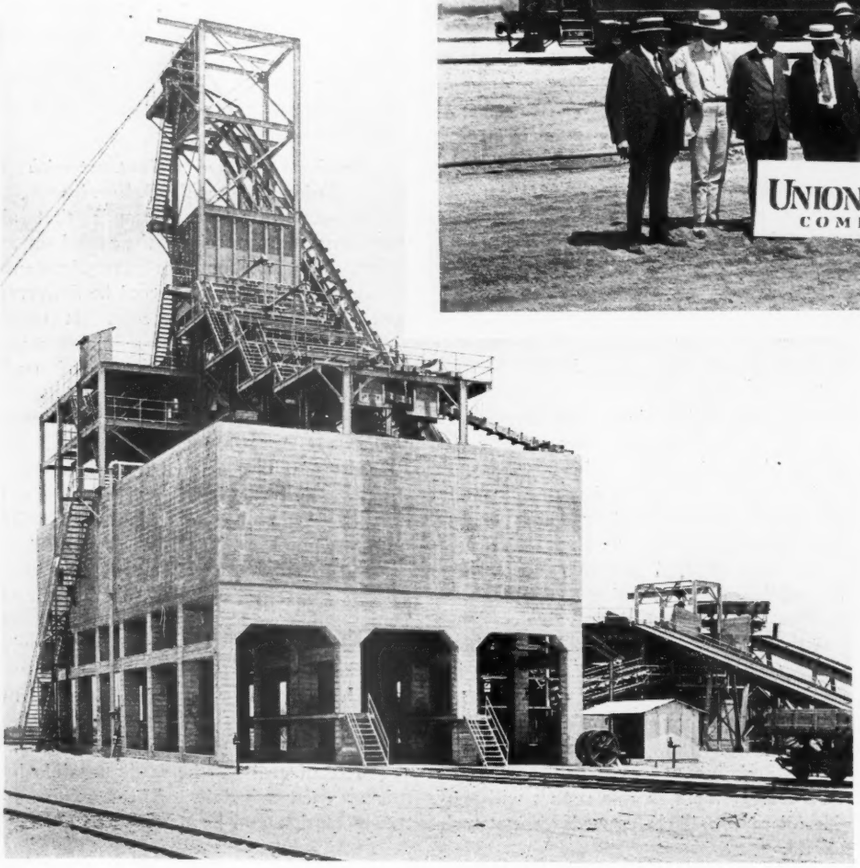
The company entertained more than 1000 persons, including public officials, railway officials, contractors and others engaged in the construction industry, with a Spanish barbecue. Tables were set in a large tent. After dinner had been served there was a brief program with Harry Lee Martin, vice-president and general manager of the Mortgage Guaranty Co., as master of ceremonies. Short specehes were made by D. W. Pontius, general manager of the Pacific Electric railway; R. F. McClellan, chairman of Los Angeles county board of supervisors; W. P. Jeffries, president of Jonathan Club, and others. A surprise feature of the program was the presentation of a fine gold watch and chain to George A. Rogers, president of the Union Rock Co., by the heads of the various departments in appreciation of his efforts in connection with the erection of the new plant.

Following the program the plant was formally put in operation and the guests were invited to make an inspection of it. The construction of this new plant is in striking contrast with the usual rock and gravel plant. The entire structure is built of reinforced concrete and structural steel and represents the very best in modern practice for plants of this character.

The pit from which material is being taken is located on the San Gabriel gravel cone and represents one of the best high-grade deposits in the vicinity of Los Ange-



Geo. A. Rogers, president, Union Rock Co.; T. J. Day, vice-president in charge of traffic, Pacific Electric R. R. Co.; Harry Lee Martin, vice-president, Union Rock Co.; J. Kelliher, Los Angeles County Flood Control District; L. L. Rogers, vice-president, Union Rock Co.; R. F. McClellan, chairman, Board of Supervisors, Los Angeles County; W. P. Jeffries, president, Angeles Mesa Land Co.; J. Bean, member Board of Supervisors, Los Angeles County; Henry Wright, member Board of Supervisors, Los Angeles County; T. B. Talbert, chairman, Board of Supervisors, Orange County; E. R. Werdin, president, Los Angeles Paving Co.



Baldwin Park plant, Union Rock Co., Los Angeles, Calif.

Million-gallon reservoir in foreground; the rock screening end of plant No. 2 is shown and Crushton plant No. 1 is shown on the left-hand side

Looking north from loft of plant No. 2, showing water supply and reservoir, oil reservoir, etc. Puente Largo, Kincaid and Rivas plants of this company are located at the slope of the foothills shown in the distance; about two miles of private railroad track serves Crushton No. 2 plant

The 40-ft. pit level and incline to new plant; the floor of pit will be lowered to the 80-ft. level for this plant

Twelve-yard loaded railway car ready to dump over grizzly for primary separation; also 10-ton skip on its way to receiving hopper loaded with material to be washed, screened and sized ready for shipment; sand and gravel screens and launders also shown over the bins

les. The material down to the 40-ft. level is worked through one of the company's plants known as Crushton No. 1 located on the east bank of the pit, while material from the 40-ft. to the 80-ft. level is to be taken through the new plant located on the opposite side of the pit and will be known as Crushton No. 2 plant.

The plant was designed by J. C. Buckbee Co., engineers, Chicago, Ill., for a capacity of 500 tons per hour with bin storage of 5000 tons. About 100,000 tons of additional bulk storage will be provided later through the use of a shuttle conveyor and tripper.

The material in the pit is loaded into 12-yd. dump cars by steam shovel and hauled in trains to the foot of the double-track pit car incline by a locomotive. The slope of the incline is 20 deg. from the horizontal. Two car units are operated on each track by means of a balanced hoist equipped with 150-hp. slip-ring motor. The cars are dumped over grizzly bars, passing all sand and gravel up to 4 in. in diameter to a steel receiving hopper, from which it is taken by belt conveyor to a reinforced concrete receiving hopper located on a lower level. All rock retained on the grizzly bars passes through a No. 7½ Gates type gyratory crusher into another concrete receiving hopper adjoining the hopper receiving the sand and gravel. Air controlled gates feed the material from these hoppers into two 10-ton balanced skips.

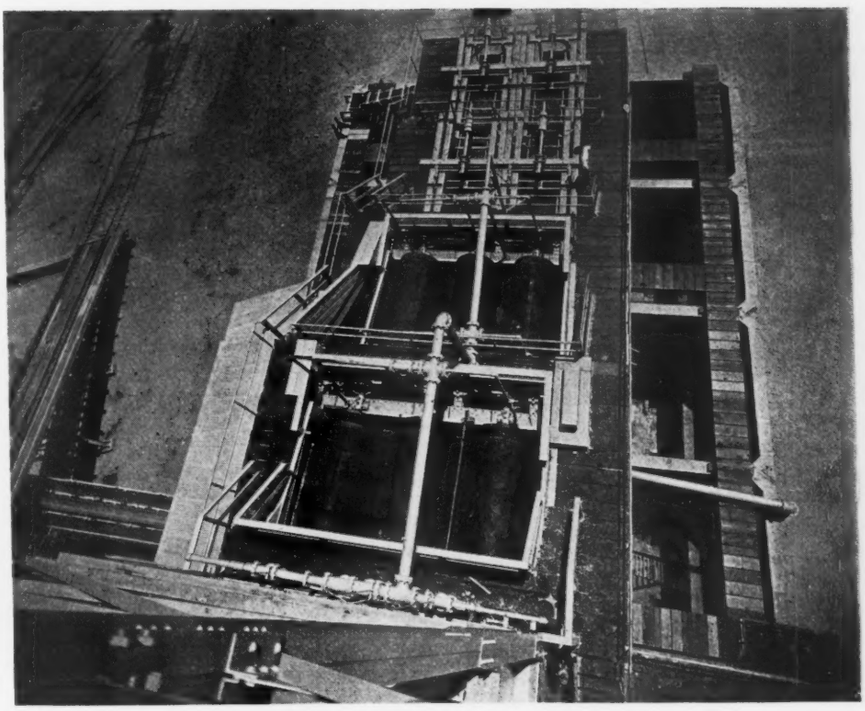
A complete separation of the broken rock from the sand and gravel is maintained by use of a double receiving bin in the loft of the plant from which reciprocating feeders discharge directly into revolving screens, the broken stone passing out in the opposite direction from the sand and gravel. Two No. 6 Gates type gyratory crushers are provided for the recrushing of oversize rock and one No. 5 Gates type crusher to handle oversize gravel. All recrushed material is carried by belt conveyors to the receiving hopper, where it is again taken up for screening and separation.

Nearly two miles of private railroad trackage were built to serve the plant, and a complete water supply developed, including a 300-ft. well, a million-gallon concrete storage reservoir, pipe lines and pumps to provide for cleaning and separation of the sand and gravel.

The plant was erected by the Wheeler Co. of Los Angeles. C. W. Resmaw and the writer were the engineers for the company in charge of construction.

The crushers, screens, hoists, motors and automatic electrical control were furnished by the Allis-Chalmers Manufacturing Co. The automatic sand tanks, reciprocating feeders, silent chain drives and bin gates were furnished by the Link-Belt Co.

The officials of the Union Rock Co. are: President, George A. Rogers; vice-president, L. L. Rogers; vice-president, Harry Lee Martin; secretary, R. E. Rogers, and treasurer, T. C. Rogers.



Down view from top of head frame overlooking sand and gravel screens and sand launders and water system; crushed rock screens on opposite side of tower

North end of plant; rock screens can be seen on top of bins

Spreading Stone Dust With Compressed Air to Prevent Coal Dust Explosions*

Just How Rock Dust Is Used

By C. Moran

NINETEEN explosions, causing the loss of 530 lives and millions of dollars worth of property, have occurred in our coal mines during the past six years, and substantially all these disasters were confined to bituminous collieries and were attributable to coal dust.

In their effort to check coal-dust explosion, investigators of the United States Bureau of Mines found that watering is an effective preventative when done regularly and thoroughly, but comparatively few mines have adopted this system. Casting about for some other method, they discovered that by spraying the mine with rock dust the coal dust is rendered non-explosive. With this fact established, the first step was to determine the relative explosibility of various coal dusts. To this end, samples of coal dust from all over the world have been tested by "firing" them in a rather unique cannon, shown in an accompanying illustration; and with the information so obtained it is possible to tell just what admixture of stone dust is needed to prevent an explosion.

The work of firing is done as follows: Samples of coal dust are placed in the series of five nipples connecting the cannon proper with the smaller pipe underneath, through which compressed air is forced at a pressure of 100 lb.; and pieces of guncotton are inserted at intervals of a few inches along the bore. When all is in readiness, the operator, with his right hand, releases the compressed air that blows the coal dust into the cannon, and an instant later, with his left hand, fires a shot of gunpowder. The mild explosion that follows ignites the guncotton; and the length of the flame, which is also an index of the menace of the coal dust, is measured by the number of pieces of guncotton ignited.

When the explosibility of the coal dust is known, then the management of the mine from which the sample was taken is given detailed instructions as to the kind and the quantity of rock dust required to make the coal dust non-explosive. Many sorts of rock dust have been found suitable for the purpose, notably limestone and light-colored clayey shale free from flinty particles that might be injurious to the health of the miners.

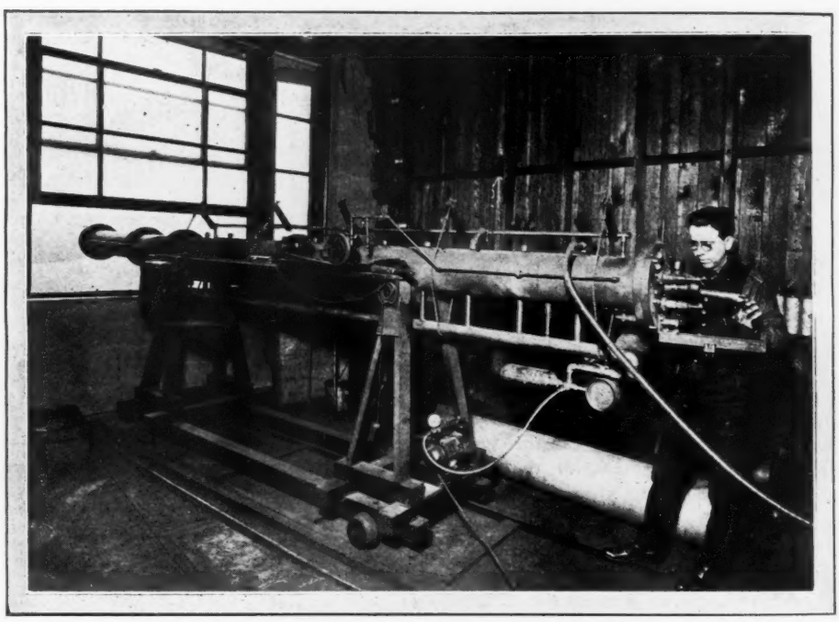
*From "Compressed Air Magazine," July, 1924.

Numerous methods of distributing rock dust throughout mine workings have been developed. One of these is a type of ejector, which is coupled by a hose to a compressed air main and draws its supply of stone dust from a car through a pipe or hose. A variation of this is an ejector, likewise linked up with the permanent air line and having one of its legs standing in a car of stone dust. The effective reach of this system depends on the frequency of the available air connections and on the length of hose that can be conveniently carried. With this arrangement, traces of stone dust have been found in workings three-quarters of a mile away from the point of distribution.

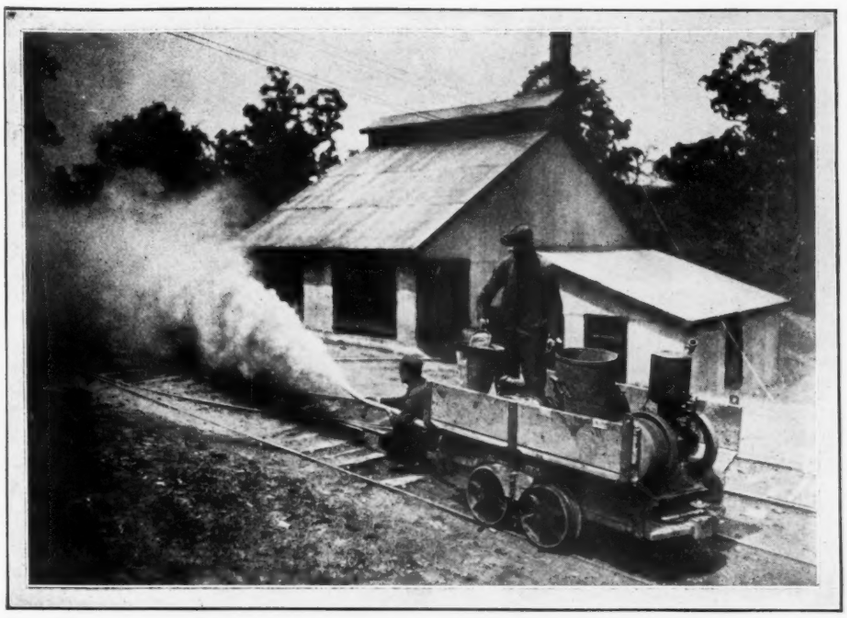
Yet another method employs a system of 1-in. or 2-in. air piping having connections spaced 50 yd. apart. Before beginning operations, bags of stone dust are deposited at intervals along the mine roadway. The men in charge start at the outby end with a bag or two in a mine car and, with the blower coupled to the nearest compressed air tap, dust the roof, sides, and floor as the car moves along. When they have gone as far as the 25-yd. length of flexible hose permits, they simply shift it to the next nearest convenient connection in the air line.

Various other mechanical and hand methods have been devised and are employed for this service, the value of which is being recognized in the coal-mining industry. While it has not yet been widely adopted in the United States, operators of collieries in southern Illinois claim that "rock-dust barriers have prevented many coal-dust explosions, started by local explosions of fire damp or by shot firing, from propagating beyond the barrier in the mouth of the panel in which the explosion originated." The managements of other mines, in which disastrous coal-dust explosions have occurred despite watering, are now considering the adoption of rock dusting.

Tests conducted in the experimental mine of the United States Bureau of Mines have shown that pure, fine, bituminous coal dust will propagate an explosion even when it carries 25% water. The mere wetting of the floor and sides is not enough to halt an explosive wave if coal dust lies on timbers, in overhead cavities,



Gun devised by the experts of the United States Bureau of Mines for testing the relative explosibility of different kinds of coal dust—Courtesy of "Compressed-Air Magazine"



Mobile compressor plant adapted to the distribution of rock dust as a means for preventing coal-dust explosions—Courtesy of "Compressed Air Magazine"

or on ledges within reach of the concussion preceding the flame. To keep long haulage roads and old workings thoroughly wet all the time is decidedly difficult because of the rapidity with which moisture evaporates or sinks into the ground. Moreover, it is a hard proposition to wet fresh coal dust. When undisturbed, coal dust will float so thickly on water for long periods that the top layer may be fanned into the air.

After rock dusting, many roadways do not have to be gone over again for a week or two, and other parts of the mine may not need redusting for months. Light-colored dust is visible, and has the added advantage of greatly increasing the illuminating effect of a miner's lamp. Wetting intensifies the blackness of the walls. More light in the passageways tends to lessen the number of minor accidents.

An official mission from Great Britain, where stone dusting has now been well-nigh universally adopted, recently visited the United States to arrange with the Bureau of Mines for joint research work in this field of effort. A series of coal-dust explosion tests, made for the foreign investigators in the experimental mine at Bruceton, Penn., revealed that British Silkstone coal dust is similar to Pittsburgh coal dust and requires about the same amount of inert or rock dust for the purpose of safe-guarding against the hazards of coal-dust explosions. Meetings with mining men were held in Pennsylvania, West Virginia, and Illinois, at which members of the British mission explained the methods of rock dusting used in Great Britain. The mission includes Prof. R. V. Wheeler, Director of the British Mines Explosion Experimental Station at Eskmeals.

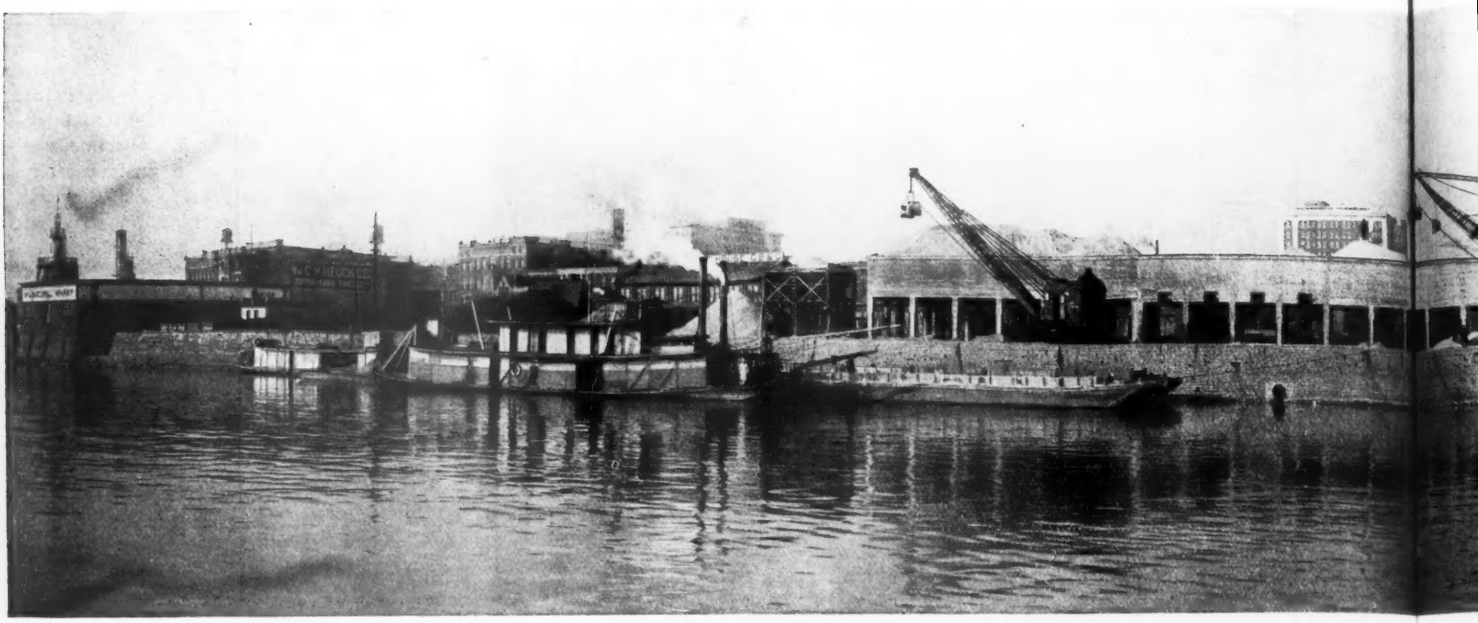
Producers After the Business

OPPOSITE are some advertisements in the July issue of the *Explosives Engineer*. Here are a few pulverized limestone producers who are not letting the grass grow under their feet in getting this new business. We are informed that at least one of these companies has been making shipments of limestone dust to coal mines for several weeks past, and that mine operators are very receptive to their sales arguments and anxious to use the dust; but that they are not anxious to be compelled to use it by law.

The principal competitive material is shale dust pulverized by the mining company itself. If rock producers will study the effects of limestone and gypsum dust on tuberculosis sufferers and the data accumulated by the U. S. Department of Labor on the effet of rock dust generally, especially dust containing silica, they will have no trouble selling limestone and gypsum dust in competition with shale dust.

Ads for limestone dust

Rock dust is so carried on overhead shelves and on top of lateral rails in some coal mines that the air wave preceding an explosion will shake down the dust and form a barrage against the progress of the following explosive flame—Courtesy of "Compressed Air Magazine"



The unloading dock for handling sand, gravel and crushed stone and the fleet of the Builders Sand and Gravel Co., at Daven from the work of one man with a small scow and a push

A Sand and Gravel Business Which Is 70 Years Old

How It Grew from a Single Scow and a Push Pole to One of the Best Equipped Plants on the Mississippi

FEW sand and gravel operations in the United States can show a record of more than 25 years of production, but there is one company that can claim a continuous record of production for almost three times that period ,although not under the same name.

This is the Builders Sand and Gravel Co. of Davenport, Iowa. Hans Goos of Davenport is the president, manager and principal owner of the company and it was his father who began the business 70 years ago.

It is interesting to compare the present splendid plant and equipment, which is shown in the picture above with the elder Goos' outfit. This consisted of a small flat-boat and the propelling power was a pike pole or "setting pole" by which the boat was slowly and toilsomely propelled along the backwaters of the Mississippi. The sand was dug from bars and loaded on the boat by a wheelbarrow. Perforated shovels were used to allow the water to drain from the sand before it was thrown into the wheelbarrow.

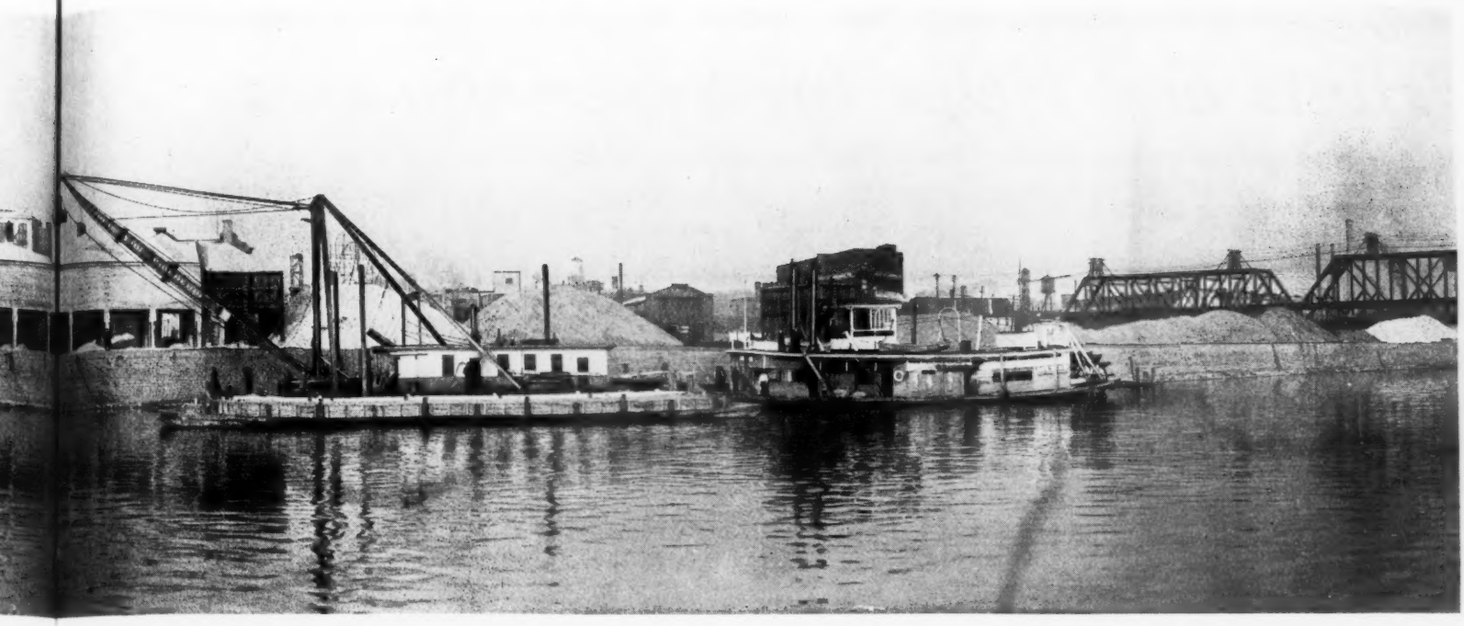
In the course of time the business grew to where the craft had to work farther up and down the river to find good sand and to make deliveries. So the pike pole was laid aside and the flat boat was fitted with a sail and rudder and made trips as far south as Muscatine and as far north as Hampton—wind and water permitting. This was about the middle of the last century when the steamboats were fairly common on the big river, but sails were still in use where speed and regular trips were not essential.

By 1880 the business had grown to where the sailboat was too slow and too irregular and the company (for it was a company by this time) built a dredge and bought a steamer for towing barges. Business was good in the 80's when the river towns were growing rapidly. The Rock Island arsenal was a large consumer, and a steady one. In fact, the arsenal has bought building material from this company from 1863 up to the present date.

Hand unloading of barges and loading into dump carts was the established practice of those days, when labor was cheap and men did not object to such back breaking work. It is astonishing how much sand some of those shovelers could handle in a day, as shown by old records.

The present company was incorporated in

Loading bins on the dock



vel Co., at Davenport, Iowa. The fleet includes a self-propelling dredge, barges and a derrick boat. All of this has grown cow and a push pole, who began operations 70 years ago

1891. A pump dredge was built and substituted for the original ladder dredge and a bigger towboat was purchased.

At present the company handles sand, gravel and crushed stone, the latter from nearby quarries. Sand is pumped from a point 10 or 12 miles down stream and gravel from the company's own gravel pit 30 miles upstream. Barges loaded with these materials are towed into Davenport by two of the company's stern wheel steamboats.

For unloading the company has a locomotive crane on its dock, opposite the arsenal, and a big derrick boat which handles a clamshell derrick.

These machines unload the material into concrete bins of very substantial construction. A railroad runs the full length of the dock and either cars, barges or trucks can be loaded, according to the delivery that is wanted.

A considerable business is done in "concrete mix," sand and either gravel or crushed stone, so mixed and graded as to need only the addition of cement and water to make concrete. Daily production runs around 1500 tons.

The company has a practically unlimited supply from which to draw its material, so there is no reason why the end of another 70 years should not see it still in business and going strong.

Big Teeth Found by Gravel Dredges

O. D. BURTON, who has charge of the sand boat of the Missouri Sand and Gravel Co., of Caruthersville, Mo., has a tooth of some prehistoric and now extinct animal. The tooth, in a perfect state of preservation, is about 8 in. long by 4 in. wide, with a pronged root 6 in. long, and weighs 5½ lb. This tooth, with three others of somewhat smaller dimensions, was pumped up from a depth of 20 ft. below the bed of the river, about midstream, in front of Caruthersville recently. At the same place and only a short time previous, three similar teeth were pumped up by the H. C. May Sand Co.—*Poplar Bluff (Mo.) Republican.*

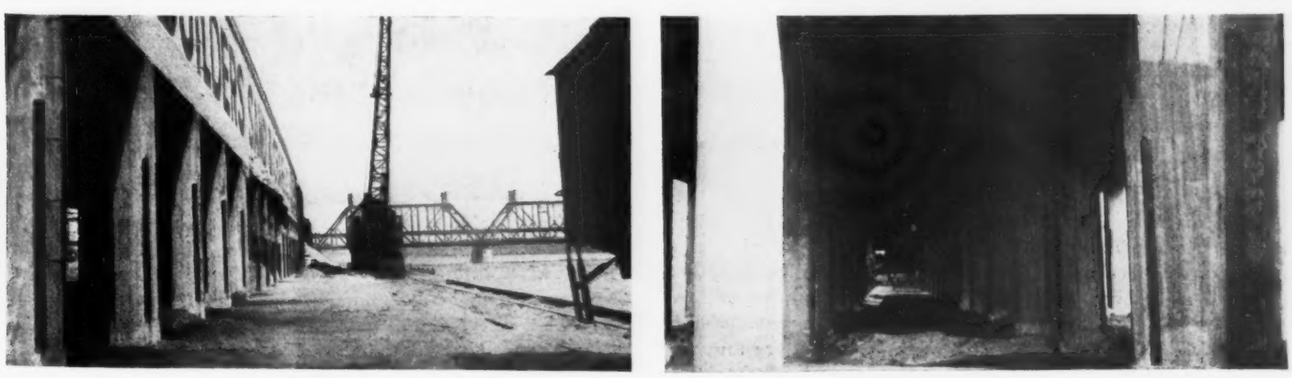
Another Gravel Plant for Los Angeles

THE contract for the erection of the plant of the Builders' Crushed Rock Products Co. at Azusa, Calif., a suburb of Los Angeles, has been awarded, according to Hyrum Ricks, Jr., and work on the structure will be started at once on a site just west of town. The plant will cost about $150,000 and is to be completed by the early part of September. The company will put in its own power station, Mr. Ricks states.

The Santa Fe railroad has completed the grade for the spur from the main line to the plant and rails will be laid shortly.

California Gravel Contains $600,000,000 Worth of Gold

RECENT estimates by the state geologist of California show that the gravel deposits of that state still contain $600,000,000 worth of gold. Some portion of this will be recovered as a byproduct of the sand and gravel industry.

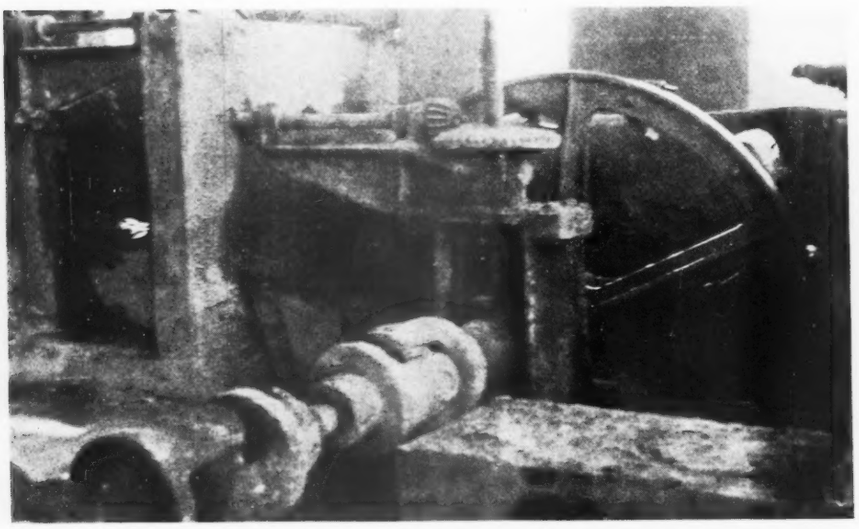


Crane in front of loading bins and where the trucks dive through

Hints and Helps for Superintendents

System of Feeding Slurry or Other Thick Liquid

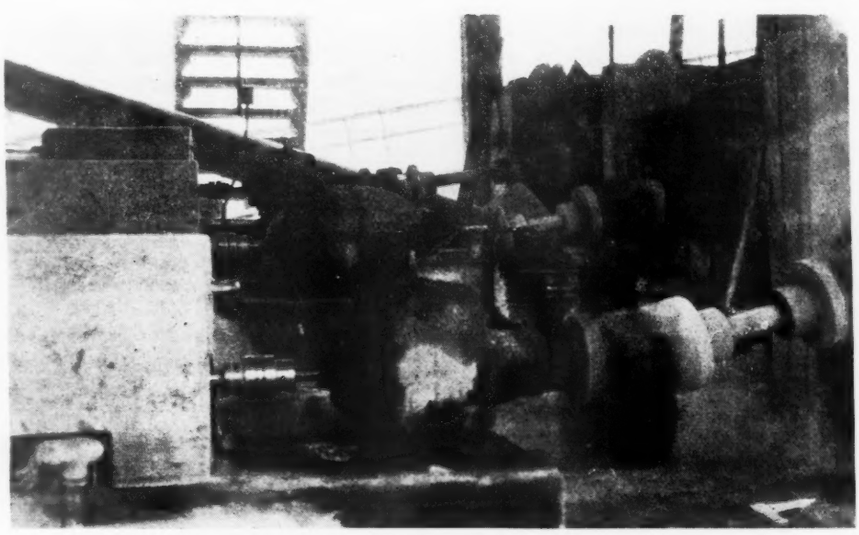
THE photographs show details of a system of feeding cement slurry to kilns that is said to have worked well. It consists of a wheel with a series of cups which lift the slurry and drop it into a trough through which it runs to the kilns.



Slurry feeder of the Ferris wheel type with universal-jointed driving shaft

In order to regulate the amount of feed lifted by the cups a unique mechanical combination was devised. The shaft which carried the wheel with the cups was passed through a bearing that could be raised and lowered by a screw driven by a gear and pinion. Raising and lowering this shaft threw it out of line with the motor so the motor and shaft were connected with two universal joints.

As the heel had to run slowly, as compared with the speed of the motor, a reducing gear was introduced between the motor and the universal joints. There probably were special reasons for this arrangement, which is more complicated than usual.



Another view of feeders showing motor housing and speed-reducing gears

Keeping Crushing Rolls in Order

TO KEEP rolls in good working order it is necessary to maintain the roll shells in a smooth, straight shape. The corrugations are caused by an incorrect speed and an uneven feed, and they are fewest in rolls fed with an automatic feeder which delivers an even stream of ore over the entire width of the roll face. When rolling down the spout, a classification of the material takes place. The large pieces bounce toward the edges, and those of small size fall directly in the rolls. To prevent corrugations and flanging, the whole shaft and roll is adjustable endwise by a collar or nuts and washers.

When no feeder is used, an adjustable deflection plate can be bolted in the hopper (all the bolts provided with lock washers or cotter-pins to prevent their loosening and falling in the rolls), directing the ore toward the high places of the rolls. A simple device also used is a frame holding two or three carborundum bricks, usually 3 in. sq. and about 6 in. long. They are placed in the top housing and ride on the roll, their own weight being sufficient to wear off the ridges.

Sometimes with hard ores and soft-spotted shells it is necessary to true the shell surface in the lathe or in place. If done on the lathe the whole roll and shaft must be taken out, whereas if done in place the top housing is removed, two square pieces of steel are bolted on the frame, and a lathe compound rest with tool-holder is clamped on the bars, the speed reduced by using a 1- or 2-hp. motor, back-geared and belted to the large pulley of the roll. To change a roll shell it must be remembered that the hub is made of two flanges—one tight and one loose. The loose one must be forced out by three or four bolts and some pounding. Often the shell must be heated by coiling old rope around the outside, soaked with waste oil, and lighted.

The bearings may need rebabbitting. This can be done in place or in the machine shop and bored out to size; but care should be taken that the oil grooves are of ample size. It is advisable to leave an empty space on the side where the shaft exerts no working pressure, and to have such space filled with loose hemp or flax, or, still better, with woolen waste resting in oil. This provides an abundant supply of oil to the journal and at the same time wipes off any dust or rock which may have found its way into the bearing. The dust-proof covers must be examined periodically.—*Engineering and Mining Journal-Press.*

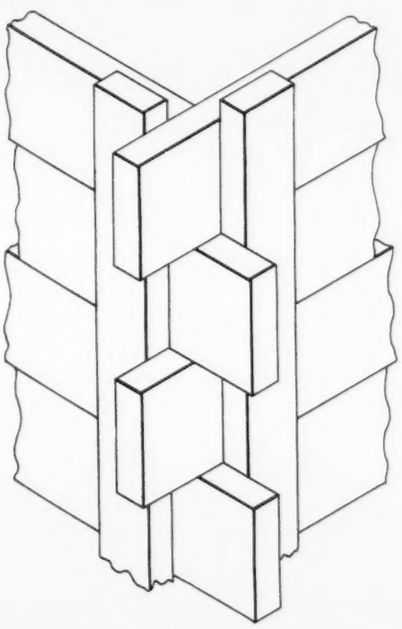
Method of Building a Bin

THE difficult part of building a bin is the joining of the planks at the corners. There are two or three ways of making bin corners and one of the simplest and cheapest is that shown in the cut.

The plans are set up "log cabin" style, the ends of every other plank being brought by the corner. Two 2x6 in. pieces are nailed against the planks and against these ends in the manner shown in the cut.

This makes a strong corner because the pressure must be sufficient, not only to pull the nails on one 2x6-in. piece but to bend over or break off the nails that fasten the planks to the other 2x6-in. piece.

This construction is best adapted to small bins which are put up by the plant carpenter or unskilled workmen, since no special skill is required to carry up the bin after it has been started correctly.



Method of building a bin that gives extra strength and rigidity with the use of planks on end without the use of corner posts

Another Use for Old Screens

MANY uses for old screens have been have been shown in these pages. A simple and yet valuable employment of old screens is that of protection. They are shown in the illustration on the roof of a steam shovel when they serve to protect the roof from small stones that may fly from "pop" shooting. The photograph was taken at the quarry of the Duluth Crushed Stone Co.

Possibly the idea was suggested by a desire to save the good appearance of a nice, shiny, new shovel. The views show the curve of the plates is just about right for this service too.

Repairing Worn Rope Drum

By W. DOLL

Superintendent, Sheldon Slate Products Co., Granville, N. Y.

HERE is a kink which we found of considerable value in our quarry operation. It is for increasing the life of a bull-wheel on the endless rope drum of a hoisting engine.

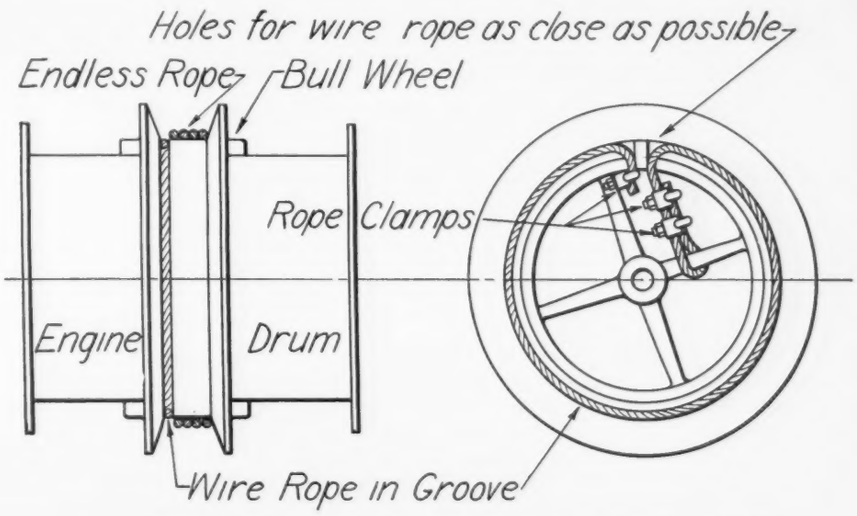
There is usually slippage of the rope around an endless rope drum which, in time, wears grooves in the drum. In the Vermont slate region it is the practice to use a bull-wheel on this drum, giving the rope four wraps around it. This bull-wheel has steep tapered flanges and at the base of the taper is about 3 in. wider than the four wraps of rope.

In our case, one groove usually appears first getting gradually deeper and deeper. If allowed to go too deep, the rope will not climb out of it. The consequence is that the rope will wrap upon itself. When this happens the incoming and outgoing ropes try to go in the same direction causing a tremendous strain on all of the equipment and sometimes breaking the rope.

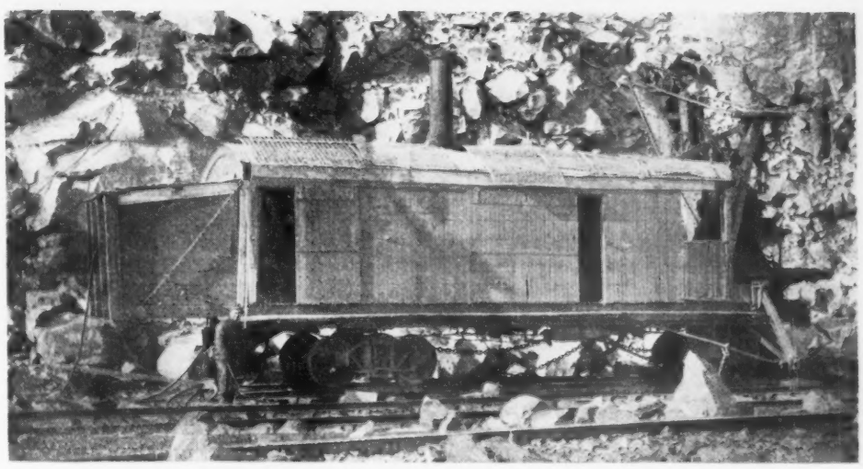
When this happened on one of our engines we drilled two holes in the groove and stretched a piece of wire rope around the drum filling the groove. One end was passed through one of the holes and fastened against the inner periphery of the drum. The other end was passed around the groove through the second hole, snubbed around a spoke of the drum, pulled tight with chain falls and clamped. Each hole was chamfered in the direction of the rope so that the bend in the rope would be as long as possible.

This job was done in less than three hours, without slacking off the endless rope, and stood up for nearly a year working every day.

SUPERINTENDENTS! If you are reading these pages you will note some of your fraternity are beginning to contribute. Let's have a little story about your pet kink.



Repairing a worn rope drum—a kink developed by a Vermont slate quarry superintendent



Using old cylindrical screen plates to save the roof of a nice, new steam shovel

Portland Cement Output in June, 1924

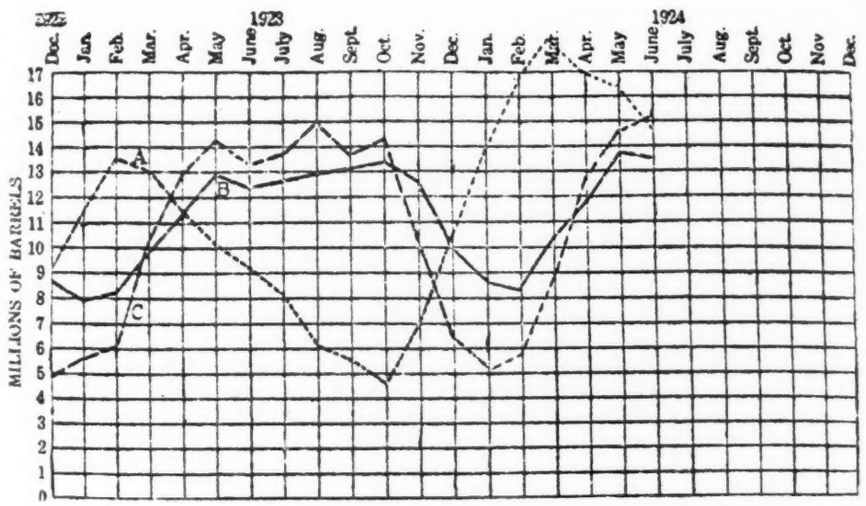
Stocks High Compared with Previous Years

THE statistics shown in the following tables issued by the Department of the Interior, and prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for June, 1924, were made necessary by the lack of returns from two plants.

Shipments for the month are the greatest on record, production is exceeded only by that of May, and stocks are over 62% higher than in June, 1923.

Stocks of clinker, or unground cement, at the mills at the end of June, 1924, amounted to about 7,618,000 bbl. compared with 8,225,000 bbl. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in May, 1924, amounted to 161,304 bbl., valued at $232,950. The total imports in 1923 amounted to 1,678,636 bbl., valued at $2,964,098.



Portland cement production, stocks and shipments. (A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JUNE, 1923 AND 1924, AND STOCKS IN MAY, 1924, IN BARRELS

Commercial district	Production—June 1923	Production—June 1924	Shipments—June 1923	Shipments—June 1924	Stocks at end of June 1923*	Stocks at end of June 1924	Stocks at end of May, 1924*
Eastern Pa., N. J. & Md.	3,155,000	3,301,000	3,415,000	3,945,000	3,082,000	3,521,000	4,165,000
New York	648,000	696,000	676,000	906,000	730,000	1,028,000	1,238,000
Ohio, Western Pa. & W. Va.	1,263,000	1,282,000	1,359,000	1,526,000	915,000	1,639,000	1,883,000
Michigan	747,000	899,000	863,000	1,093,000	433,000	571,000	765,000
Wis.,† Ill. ,Ind. & Ky.	1,867,000	2,044,000	2,093,000	2,209,000	529,000	2,358,000	2,524,000
Va., Tenn., Ala. & Ga.	647,000	939,000	663,000	956,000	191,000	754,000	771,000
E'n Mo., Ia. & Minn.	1,224,000	1,444,000	1,447,000	1,524,000	1,299,000	2,410,000	2,491,000
Western Mo., Neb., Kans. & Okla.	866,000	939,000	768,000	840,000	978,000	1,195,000	1,096,000
Texas	334,000	390,000	368,000	401,000	201,000	298,000	308,000
Colo. & Utah	276,000	279,000	276,000	275,000	178,000	188,000	183,000
California	1,021,000	992,000	1,000,000	1,010,000	156,000	364,000	382,000
Ore., Wash. & Mont.	334,000	333,000	379,000	351,000	476,000	579,000	597,000
	12,382,000	13,538,000	13,307,000	15,036,000	9,168,000	14,905,000	16,403,000

*Revised. †Began producing June, 1924.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS

Month	Production 1923	Production 1924	Shipments 1923	Shipments 1924	Stocks at end of month 1923*	Stocks at end of month 1924
January	7,990,000	8,788,000	*5,628,000	5,210,000	11,477,000	*14,155,000
February	8,210,000	8,588,000	*6,090.000	5,933,000	13,596,000	*16,815,000
March	9,880,000	10,370,000	10,326,000	8,995,000	13,045,000	*18,189,000
First quarter	26,080,000	27,746,000	22,044,000	20,138,000		
April	11,359,000	11,726,000	12,954,000	12,771,000	11,463,000	*17,159,000
May	12,910,000	13,777,000	14,257,000	14,551,000	10,144,000	*16,403,000
June	12,382,000	13,538,000	13,307,000	15,036,000	9,168,000	14,905,000
Second quarter	36,651,000	39,041,000	40,518,000	42,358,000		
July	12,620,000		13,712,000		8,081,000	
August	12,967,000		14,971,000		6,080.000	
September	13,109,000		13,698,000		5,533,000	
Third quarter	38,696,000		42,381,000			
October	13,350,000		14,285,000		4,612,000	
November	12,603,000		10,251,000		6,991,000	
December	9,997,000		6,408,000		10,900,000	
Fourth quarter	35,950,000		30,944,000			
Preliminary total	137,377,000		135,887,000			
Amount of under estimate	83,238		25,118			
Final total	137,460,238		135,912,118			

*Revised.

The imports in May were from Belgium, 115,592 bbl.; Norway, 33,808 bbl.; Denmark, 5863 bbl.; England, 2502 bbl.; Germany, 1531 bbl.; Canada, 846 bbl.; France, 656 bbl.; China (Kwangtung), 506 bbl. The imports were received in the following districts: Los Angeles, 49,012 bbl.; Philadelphia, 30,562 bbl.; Hawaii, 26,135 bbl.; San Francisco, 12,821 bbl.; Porto Rico, 10,462 bbl.; New York, 7423 bbl.; Florida, 7327 bbl.; New Orleans, 7041 bbl.; Maine, 4921 bbl.; South Carolina, 3003 bbl.; and Washington, 2597 bbl., which includes 840 bbl. from Canada.

The exports of hydraulic cement in May, 1924, were 88,850 bbl., valued at $262,290, of which was sent to Cuba, 29,600 bbl.; to the other West Indies, 5338 bbl.; Mexico, 20,087 bbl.; South America, 18,498 bbl.; Central America, 7313 bbl.; Canada, 3169 bbl.; and to other countries, 4845 bbl.

The statistics of imports and exports of hydraulic cement in June, 1924, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS*

Month	Imports 1923	Imports 1924	Exports 1923	Exports 1924
January	71,686	153,732	74,169	88,586
February	20,529	162,930	88,531	62,606
March	66,521	160,517	98,861	91,224
April	76,899	148,138	85,662	83,200
May	88,480	161,304	103,634	88,850
June	111,559	(‡)	77,203	(‡)
July	286,106		82,774	
August	324,008		73,201	
September	215,785		77,121	
October	172,051		74,302	
November	140,590		85,743	
December	104,422		80,487	
	1,678,636		1,001,688	

*Compiled from records of the Bureau of Foreign and Domestic Commerce.
‡Imports and exports in June, 1924, not available.

Editorial Comment

On Being Alive

Here is a true story, reported verbatim, by someone who did not expect it to be published; but it is the best little "editorial" we have seen in many a day, so why should we not share it with our friends (with some camouflage of names and locality)? It is quite relevant at this time, too, because all industry is undoubtedly approaching a period of stiffer competition and it will be the "live" ones who know how to handle their business under these conditions.

"Had a great time with P. D. Q. of the Decadence Sand Co. today. I waited all the morning for him to show up, and when he finally came in, he was all fussed up because a tow boat had broken her propeller and a dredge was down for repairs.

"Finally he got to talk to me and said he wasn't interested in Rock Products and had ordered it stopped. He said it was a d—n shame the way the mails were cluttered up with stuff that nobody read.

"I told him nobody was forcing Rock Products on him; and that if he had wanted it he would have had to pay for it like everybody else who gets it; but that we would probably manage to continue in business without his subscription. I started to leave, but he calmed down and got apologetic, and finally said the *real reason* he didn't continue his subscription was that business was bad, and they were cutting down expenses, including advertising and subscriptions to all trade papers.

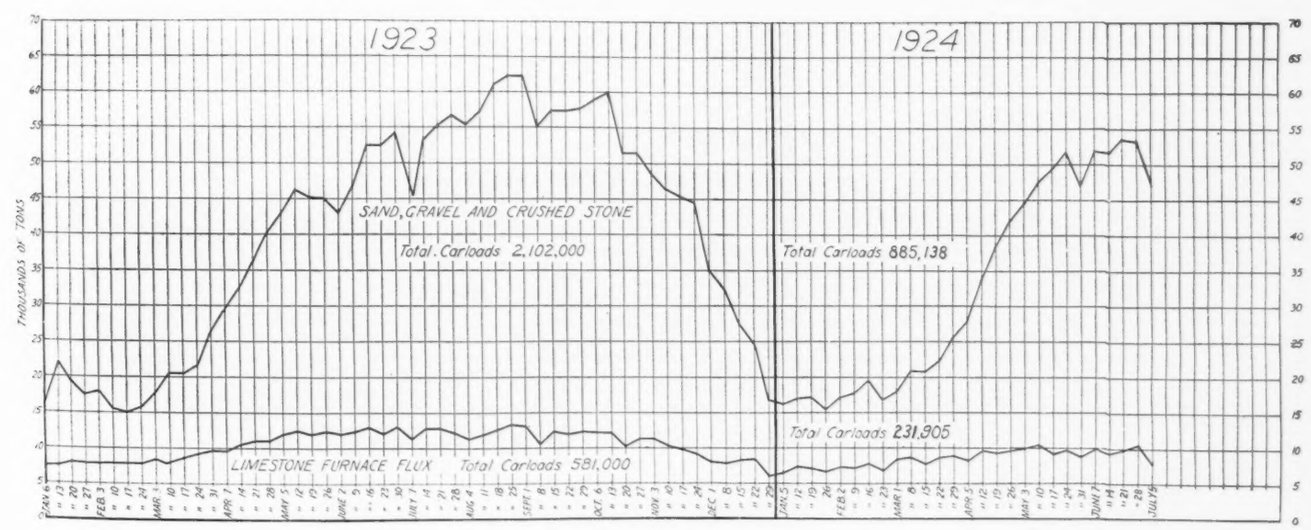
"I said he was the first producer in his district who had told me business was bad. He replied that any producer who said otherwise was a liar. I told him that *I knew* neither 'Smith' nor 'Jones' would lie to me about business conditions; and then he admitted that 'Smith' and 'Jones' might both be doing good business, *'because they had some big contracts to fill.'*

"I subsequently got a line on this concern. Their stuff is all old and worn out. They inherited the business from their father, and I take it that they have gone on putting nothing in and taking everything out until they have left only a bunch of junk. And since they are the kind of people who cannot find time to read their trade papers I do not wonder at their doing this. One can see that their finish is not far off."

We leave you, friend reader, to find the moral!

Start Public Works Now

At the beginning of the construction season in 1923, Herbert Hoover, Secretary of Commerce, wisely advised national, state and municipal authorities not to compete with private and business enterprises for short supplies of building labor and materials. The time has come to point out that such an injunction no longer holds, and that it is both good business and good insurance against a general slump in business for national, state and municipal authorities to take up any slack in the construction industry as fast as it becomes apparent. We trust all those in a position to emphasize this will do so, and we shall avoid any slump before it has a chance to come upon us. It should be pointed out to the authorities that such action is equally important to the continuation of construction work the year round, which is now being agitated by Secretary Hoover and other economists. Activity in construction is the base of all prosperity.



These curves of car loadings of sand, gravel and crushed stone do not show any signs of a depression in these industries yet

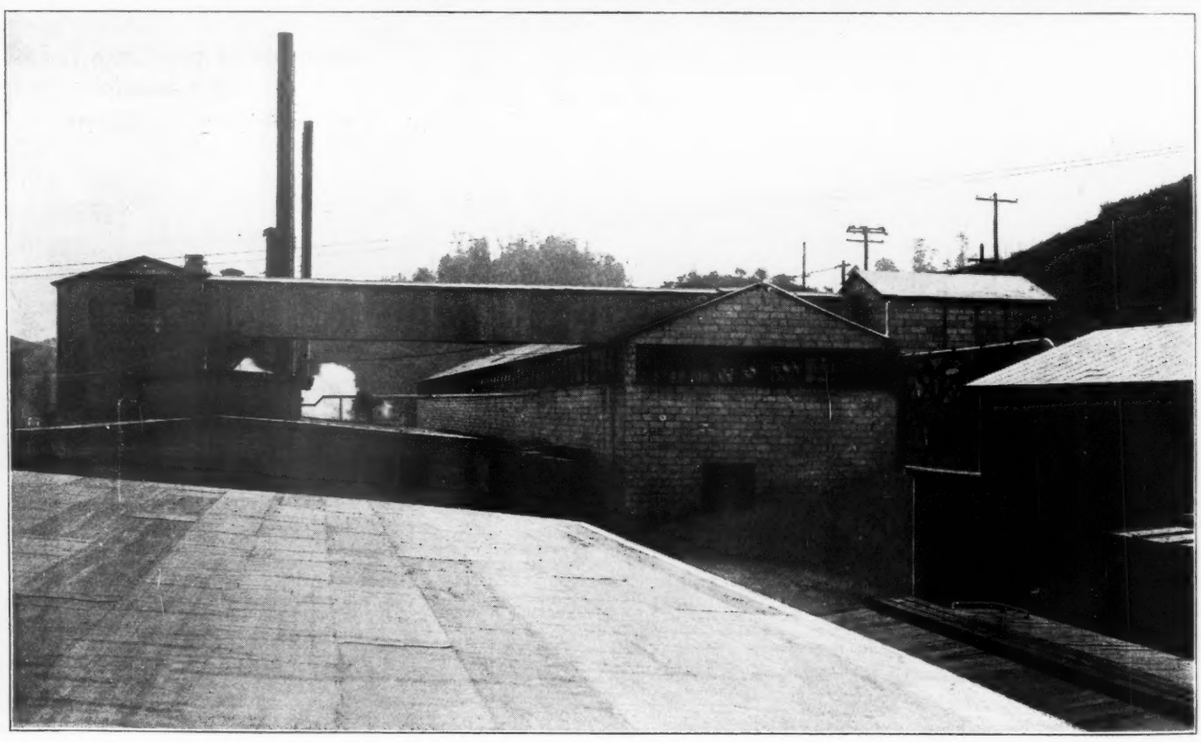
New U. S. Gypsum Co.'s Wallboard Mill in Virginia

THE United States Gypsum Co. started operation on July 15 of a new "Sheetrock" wallboard mill at Plasterco, Va. This addition to the plant which it has operated there for many years cost $400,000 and has a daily capacity of 100,000 sq. ft. of fireproof gypsum wallboard. It has been under construction since last December. All the machinery is of the most modern design, the mixers, wallboard machine and continuous kiln embodying the most recent refinements developed by the engineering department of the gypsum company.

Better service to the building trades in Virginia, West Virginia, Kentucky, Tennessee, the Carolinas, Georgia, Florida and Alabama is the object met by the addition of this mill to the mine and other operations at Plasterco. Until the present, the use of wallboards in the Southeast has been retarded by the fact that none of them has been manufactured in the region and consequently owners, contractors and dealers have had to pay high freight-tariffs to have them shipped from the North. The Plasterco plant is the only gypsum property in the Southeast making a wallboard and consequently it eliminates this difficulty. For it has easy access to the Norfolk & Western, Southern, Atlantic Coast Line and Seaboard Air Line and, through these, to all the railroads that cover the territory.

To the building trades, this means the advantage of rapid, low cost deliveries to the smallest towns as well as the larger centers. To the gypsum company, it means another approach to its ideal of service to every community in the country. For now it is able to ship the wallboard, wall and finishing plasters and agricultural

Plasterco, Va., plant of the U. S. Gypsum Co., where new $400,000 wallboard plant has just been completed



New wallboard unit of the Plasterco plant of U. S. Gypsum Co.

gypsum produced at Plasterco, together with hydrated lime, mason's hydrate, Textone the "Sheetrock" decorator and other commodities manufactured at its other plants and stocked in Plasterco, in mixed car lots at carload freight-rates.

Improved Distribution Facilities Now Available

These shipping facilities enable the company to meet the demand for its products in the Southeast. That such a demand exists is indicated by the widespread use of gypsum wallboard, both in small buildings and in large constructions. Early this year, the Elliott Building Co., of Hickory, N. C., completed the construction of the first unit of 200 houses for the Erwin Cotton Mills at Duke, N. C. "Sheetrock" was used throughout the larger buildings such as the community dining hall and the 17-room teachers' home as well as in the four-room houses which comprised the majority of the construction. The results were so satisfactory that the owners specified the same material for the second unit, 130 dwellings, now under construction.

"Sheetrock" was put to similar use in 50 houses built for the American Rolling Mills at Ashland, Ky. This project included, not only small homes for workers, but also a number of brick residences for officials of the company. Owners of such projects have found gypsum wallboard satisfactory, not only because of its insulating and fireproofing qualities, but also because, coming in large units, it promotes rapid construction.

To Find Use for Anhydrite Form of Gypsum

THE Non-Metallics Station of the U. S. Bureau of Mines at New Brunswick, N. J., is contemplating a study of the utilization of anhydrite. One of the problems to be investigated is the utilization of anhydrite as a retarder in cement in place of gypsum. It is now widely believed that anhydrite is unsuitable for this purpose, but convincing evidence is lacking and the bureau proposes to determine whether this belief is based upon a sound scientific foundation. In working out gypsum deposits, it is generally found that the percentage of anhydrite in the gypsum increases with the depth of mine. This materially shortens the life of a property and, of course, increases operating costs materially. It is, therefore, proposed to determine whether there are not practicable commercial methods for hydration of anhydrite to form either gypsum ($CaSO_4.2H_2O$) or plaster of paris ($CaSO_4.\frac{1}{2}H_2O$) from the anhydrite ($CaSO_4$). Work on this problem is only now being considered, so that it will be some time before the bureau has any conclusions for publication.

Kansas Soils Beginning to Require Lime

THE virgin soils of the famous prairie states are beginning to exhibit more and more evidence of lime starvation. The westward march of agricultural lime and limestone becomes yearly more noticeable, accordingly. The following items from Kansas newspapers are most significant:

"Farming in Neosho county may be revolutionized by as simple a thing as a limestone crusher purchased for $500 by the farm bureau last spring.

Limestone is available in three stratas running across the county. The crusher has already turned out 350 tons of lime, more than half as much as had been shipped into the county in the five years previous.

Chanute business men and Neosho county farmers gave the Kansas State Agricultural College legume prosperity special an enthuisastic reception here today. Attendance at the afternoon program, the largest reached at any point so far, was estimated at 1,200. Now that the farmers have lime almost for the asking—85 cents a ton where the stone is laid down—they want to know what to do with it.

There is a lively interest in legumes in Neosho county. C. D. Thompson, county agent, introduced soy beans in 1918. He places the soy beans acreage conservatively at 2,500 this year. Farmers peppered the speakers with questions on alfalfa, sweet clover and other legume crops. A large proportion of the farmers in the county have in the past been inclined to stick to grain.

A dairy bull club is contemplated for the purpose of encouraging diversification. J. H. Lynn, dairy specialist, and Carl Elling, an animal husbandry specialist, joined the legume tour today. Professor J. B. Fitch left it yesterday and Dr. C. W. McCampbell left after today's meeting. —*Topeka (Kan.) Capital.*

Rossville Farmers Try Lime

We have continued to find need for lime in soils from the uplands of the county in tests which have been made within the past few weeks. Since this condition has not prevailed generally in the past, a number of demonstrations are to be started in the fall and next spring to determine how beneficial liming will prove for these sections.

To assist us in introducing this work the Dolese Bros. Co. of Eldorado, Kan., have kindly consented to donate us a carload of crushed limestone to be used for these demonstrations. The car will be unloaded at Rossville. Messrs. Grant and C. E. Gresser and Mr. Frank Hromada are planning to use some of the lime and they will attempt to secure about 10 more co-operators who will conduct demonstrations. The lime will be used principally with alfalfa and sweet clover.—W. H. Metzger, County Agent, in the *Topeka Journal.*

Pine Plains Lime Company to Expand

THE capital stock of the Pine Plains Lime Co, Inc., has been increased to $150,000, the interests of the company enlarged and the office vacancies filled. A deposit of high quality limestone has been found on the property of Frank A. Strever, Pine Plains, and a plant will be built there. The standard prescribed is 83%, equivalents of carbonate of lime for agricultural purposes while the deposits on the Strever place show 97%, according to the results of tests made by the New York State College of Agriculture. The new plant will be capable of producing 300 tons a day. It is situated adjacent to the state highway and the Central New England Railroad.

The additions to its directorate and elected officers are as follows: Benson R. Frost, Rhinebeck, president; W. W. Wetterau, Poughkeepsie, vice-president; Eugene C. Kelley, Poughkeepsie, secretary; Earle D. Tobey, Poughkeepsie, treasurer; J. J. Adams, Poughkeepsie, general manager; Edgar V. Anderson, Poughkeepsie; Frank R. Chase, Pine Plains; George R. Culver, Millerton; Adrian D. Langdon, Copake; Fred B. Pulling, Lagrangeville; Dwight Sedgwick, Freedom Plains; J. Henry Smith, Wassaic; Alvah R. Stickle, Red Hook; J. Griswold Webb, Clinton Corners.—*Poughkeepsie (N. Y.) Star.*

Hazards of the Lime Industry in Chicago

CHICAGO newspapers of July 19 feature the attempted payroll robbery of the Stearns Lime and Cement Co. in the city. The robbers made away with only $500 of the $6000 payroll, after keeping the office force prisoners for half an hour awaiting the arrival of the superintendent, D. T. Healy with the cash.

A policeman, acting as guard, was shot and killed without warning.

U. S. Gypsum Company Plans Expansion on West Coast

C. A. ENGLISH, Pacific coast sales manager of the United States Gypsum Co., has returned to this city from a two weeks' trip to the East, in the course of which he conferred with officials at the Chicago headquarters of the gypsum company. Attesting the faith of that concern in the development of California. Mr. English announced the personnel of his branch will be increased and new building materials will be introduced to prospective builders in California.—*Los Angeles (Calif.) Herald.*

President of Missouri Portland Cement Company Denies Intentional Violation of Laws

H. L. BLOCK, president of the Missouri Portland Cement Co., which recently agreed to pay a $27,500 fine in anti-trust proceedings brought by Attorney General Barrett, of the State of Missouri, has issued a statement in which he disclaims any intention on the part of the firm to violate the state laws.

In the quo warranto proceeding brought by Mr. Barrett against the St. Louis Material Dealers' Association and fourteen member firms, the Continental Portland Cement Co. also agreed to pay a fine of $10,000. The other twelve firms will not be fined. The Continental company was recently absorbed by the Alpha Portland Cement Co.

Mr. Block's statement follows:

"This company was a member of the Mid-West Cement Credit and Statistical Bureau of Chicago, and also of other organizations, the purpose of which was to furnish statistical information relating to the cement industry.

"Recent decisions of the federal and state courts have indicated a tendency on the part of the courts to hold such statistical associations to be in violation of the anti-trust laws. Therefore, while not pleading guilty to the suit brought in this state by Attorney General Barrett, alleging that this company had violated the state anti-trust laws, we have thought it best to settle this litigation.

"The statistical associations to which this company belonged were organized and functioned under the advice of eminent counsel, and we hope and believe that the practices of these associations will be upheld by the Supreme Court of the United States in the test case against eastern cement manufacturers which is now pending. Very shortly after the beginning of the cement anti-trust litigation in 1921, the members of the various bureaus ceased to furnish or receive the statistical information theretofore furnished or received, thus showing their willingness to discontinue practices which have been questioned.

"This company feels that it has not violated the laws in intent. There has been a good deal of talk about a cement trust. None has existed, in fact.

"While cement prices are fairly uniform in any given territory, this has been brought about by the standardization of cement, due to the requirement that it must register up to the United States Government standards, by operating costs, being practically the same, and by competitive conditions which have forced all manufacturers to meet the price made in any given territory by the company willing to sell at the lowest prices.

"Also, while the practices of the various cement companies have been much alike, this has been brought about by the evolution of the business itself, and not by agreement. The same practical uniformity of prices and methods prevail, in our opinion, in almost if not all industries, and for the same reasons companies meeting competitive conditions, and for business reasons, though not as the result of agreements, adopted practices best suited to the particular industry."

Besides accepting the agreements to pay fines the Supreme Court, before which Mr. Barrett's proceeding was pending, issued an ouster order against the Missouri Portland Cement Co., but suspended it on condition that the company observe the state anti-trust laws in the future.—*St. Louis (Mo.) Star.*

Atlas Portland Cement Company to Fight Missouri Anti-Trust Case

A SUIT was filed in the Supreme Court July 16 against the Atlas Portland Cement Co. by Attorney General Jesse W. Barrett of Missouri charging the concern with violating the anti-trust laws and asking that it be fined and ousted.

The Atlas company is incorporated under the laws of Pennsylvania, but operates the largest cement factory in Missouri. The plant is only a few miles south of Hannibal.

The petition filed by the attorney general does not state the evidence upon which the charges are based, but it is understood that the suit arises because of the membership of the Atlas company in what was known as the Midwest Credit and Statistical Bureau at Chicago. The bureau, according to reports, was an alleged combination of a number of cement companies which exchanged statistical information with each other as to prices, production, etc., said to constitute an "open price plan." Attorney General Barrett has repeatedly held that such a plan is illegal and a violation of the Missouri laws.

Several weeks ago, similar charges were brought against the Ash Grove Portland Cement Co. and the Dewey Portland Cement Co., both with headquarters in Kansas City. The Supreme Court fined each of the firms $10,000 each and ousted them from the state, the ouster being stayed, however, upon condition that they obey the state laws in the future.

Two weeks ago the Missouri Portland Cement Co. and the Continental Portland Cement Co., both of St. Louis, entered pleas of guilty on similar charges and were fined $27,500 and $10,000, respectively. They were also ousted by the Supreme Court, but the ouster was also made conditional upon future good behavior of the companies. When asked recently whether a similar plea would be made in the Atlas Cement Co. case, the attorney general said:

"The Atlas Portland Cement Co. claims that the open-price plan which they followed does not violate either the state or federal laws. They were defendants in an injunction suit brought by the federal government in the New York courts and they have appealed from that decision to the United States Supreme Court and had retained John W. Davis to represent them both in that case and in my Missouri proceedings. Of course, Mr. Davis has now withdrawn as counsel for them, but they are going to resist the proceedings, at least until after the decision in the United States Supreme Court.

"Their attorneys have offered to stipulate that the decision of the Missouri case shall abide by the result of the decision in the United States Supreme Court. I am considering whether such an arrangement would give full protection to the state's interests and will study the pleadings and records in the government case before making my decision. It is quite possible that I shall prefer to proceed independently."—*St. Louis (Mo.) Globe-Democrat.*

More About Proposed Cement Plant in Arkansas

A TELEGRAM was received here recently from Geo. L. Sexton & Co., New York brokers, stating that all the financial arrangements have been made for the taking over of the Krippendorf-Tuttle White Cliffs Products Co. property at White Cliffs, Ark., and the establishment of a large cement plant in Arkansas. The telegram does not state where the cement plant will be established, and it is supposed this question has as yet not been settled.

The formation of a new corporation to take over the White Cliffs property and erect a cement plant to use the chalk deposits has been under way for some weeks, and all plans have been made for securing power and heat from the large power dam near Hot Springs, which is now under course of construction. Some effort has been made to locate the plant in Nashville, while still others have been made to locate the plant at White Cliffs, where the chalk deposit is.

Nashville is considered by some of the engineers who have investigated the matter as the most logical place for the location of the plant, since it is nearly centrally located between the deposits of limestone, gypsum and shale, all three of which ingredients enter largely into the manufacture of the cement. Nashville is also considered an ideal location for the plant because of the health and the railroad facilities.

The plant, when constructed, will employ a large number of men, and will have a daily output of 2000 bbl. per day. The location of the plant here would mean much to Nashville in a commercial way.—*Nashville (Ark.) News.*

More Good Newspaper Publicity for Washed Sand and Gravel

THE editor of ROCK PRODUCTS likes nothing better than to run across newspaper items like the one below. If one producer can do it, all can. Keep up the good work and the time will come when no one will have to make apologies for the sand and gravel industry! The following is from the *Rochester (N. Y.) Herald* and shows the handiwork of a good publicity man:

Good Sand and Gravel Are Essential to Construction Work, Says Local Company

The permanency and usefulness of new building construction, no matter of what type, depends largely upon the standard of raw materials selected for the various stages of the work. This is the general opinion of all engineers and architects upon whose judgment rests the responsibility for longevity of construction of modern plants, office buildings and homes. The rapid expansion of building activities, so noticeable in Rochester and vicinity, invites careful inspection and testing of all materials which lend themselves to disintegration.

A generation ago concrete construction was in its infancy and little attention was paid to the foreign matter which formed a part of the bulk. Crumbling sidewalks, foundations steadily disintegrating, cracking walls—these and other indications of inferior raw materials did not attract the notice of the average contractor to the same extent they do today. But a generation has taught builders to avoid the dross, as this, even in small quantities, has been found to be the cause of many unpleasant experiences. Many contractors have been instructed to use washed sand and gravel which provides a perfect base for all concrete work, whether building or highway construction is involved.

To produce a washed sand or gravel in quantities sufficient to meet the demand, and at the same time minimize its cost at the point of unloading, necessitated the erection of large plants, involving an enormous outlay of capital, in addition to arranging transportation facilities from the plant to the unloading station. Sand and gravel, because of their weight, cannot be handled economically except where the most modern equipment, such as steam shovels, large trucks for city hauling, etc., is introduced. These obstacles, although they may appear to be of little consequence to the average reader, presented difficulties in the way of quantity production of the manufactured product. Realizing the large market for a "finished" sand and gravel in Rochester and surrounding territory, the Consolidated Materials Corporation was formed less than six months ago, officered by prominent and successful business men, for the purpose of supplying the building trades with materials of the highest standard test and upon which they could depend for durability and permanency in construction. The ready acceptance of this plan, and the unusual success with which their products have been marketed, evidences the great need for sand and gravel properly prepared to withstand the tests of time and the assurance of protection against gradual disintegration.

It is interesting to learn that the manufacturing methods adopted by the Consolidated Materials Corporation have added but little to the cost of the raw sand and gravel removed from the pit. The saving effected by the purchase of general pit-run sand and gravel is of slight import, according to New York State engineers who have specified the washed product for highway construction. That it is more economical to use washed sand and gravel because of its longer period of usefulness and the permanency which it gives to all construction work, is no longer questioned by those who have carefully studied the use of concrete in the erection of modern structures.

Gravel Plant to Resume

EMIL E. PENZEL, receiver for the Keener Ore and Gravel Co., stated recently that the concern would resume operation of its plant near Keener, Mo., within a very short time. The exact date has not been set for resumption of operations at Keener, but Mr. Penzel declared plans are going ahead very satisfactorily to early operation of the plant.—*Poplar Bluff (Mo.) Republican.*

Gravel Rate Plea Refused

COMPLAINT was dismissed and petition for reparation denied in an order issued by the Alabama Public Service Commission, June 9, in the case of J. W. Gwin vs. the Louisville and Nashville and Western of Alabama railroads. The complaint alleged unjust and unreasonable rates on gravel, carload, from Montgomery to Pineapple, and the petition which accompanied it, asked for reparation. Decision of the commission stated that the rates complained of were not found by the commission to be unjust, unreasonable or excessive.

Lake Sand Carrier Beached

A SEVERE northeasterly gale at Chicago recently drove the "Sandcraft," a lake-going sand and gravel carrier belonging to the Construction Materials Co., ashore near 22nd St. The steamer is a former U. S. Shipping Board steamer of about 8000 tons burden, rebuilt to handle sand cargos by pumping the sand ashore. The vessel was grounded near the beach, to avoid being pounded to pieces, by opening the sea valves which let water into the sand tanks for pumping them out.

Pacific Coast Gypsum Export Orders on the Increase

OPERATION throughout last winter was maintained by the Pacific Coast Gypsum Co. of Tacoma to keep pace with its export orders, Manager J. A. Siefert reports. The company is opening new quarries in southern Montana which the management reports to be of a different geological age and type of formation from any heretofore developed in that state.

Research on Molding Sand

THE American Foundrymen's Association has just issued a pamphlet on "Tentatively Adopted Methods of Tests and Resume of Activities of a Joint Committee on Molding Sand Research." There are over 80 pages of printed matter containing, besides an introduction, various sections on the reports of the chairman of the joint committee, of the sub-committee on geological surveys, of the sub-committee on conversation and reclamation and of the sub-committee on testing methods. There are also chapters on bonding or cohesiveness tests, on revision of permeability test, on permeability tests, on the fineness test, on the dye-absorption test, on the chemical analysis of molding sand, on methods of sampling sand and on testing equipment. The organization of the joint committee was definitely effected in December, 1921, and a chairman and an executive committee were selected to exercise control over the entire investigation, except the handling of the funds required.—*Iron Age.*

Who Could Resist This Invitation?

NOTICE

WHEREAS, Our esteemed associate, Carl Brunt, opines that the Finger Lakes Region, and particularly Oaks Corners, is now at the height of its bloom, and is properly policed for our arrival, AND

WHEREAS: He has designated next Wednesday, July 23rd, as an auspicious date for the July meeting of the Association, AND

WHEREAS: He has completed arrangements for the inspection of the Oaks Corners quarry between eleven and twelve thirty o'clock, an auto trip through Geneva, then out to a club on Seneca Lake, a good old rough and ready camp dinner, a ball game between the Bachelors (if there are any) and "The Other Kind," a quoit contest between F. W. Schmidt, Sr., and F. E. Conley, and that long overdue inauguration address of Prexy Sporborg, not to speak of the red hot business meeting itself, AND

WHEREAS: Although our June meeting was a crackerjack with twenty-two in attendance, there are still a few who have not yet favored us with their presence to be initiated by submersion in Seneca Lake, and they better come along now while the water is warm, AND

WHEREAS: Everything else will be fine and dandy, including the weather,

RESOLVED: That we all drop our worldly cares on next Wednesday, July 23rd, and hasten to Geneva to meet Brother Brunt as per the following directions, no excuses being permitted and all delinquents being subject to a fine of four tons of screenings.

ET CETERA

Carl says he hopes there will be a good attendance as he is going to show us a mighty fine time.

Batteries for the ball game: Foote & Ormsby and Babcock & Woolsey.

Hop abroad next Wednesday "boys" or you will be out of luck!"

GEO. E. SCHAEFER,
New York State Crushed Stone Ass'n.

Another New Cement Plant for Ohio Reported

THE Ohio Portland Cement Co. is the third firm to announce intention of the erection of a large cement plant near Dayton (Ohio) in recent months. It was learned recently from reliable source that the Ohio firm intended the erection of a $2,000,000 plant near Germantown or Big Twin creek.

About 300 acres along the Cincinnati-Northern railroad, a branch of the Big Four railroad, has been leased for the plant and quarries, it was announced. The plant is to consist of six main buildings for which the contract for the steel framework has been let to the Bellefontaine Bridge and Steel Works. The buildings will be from 200 to 600 ft. in length and will be 50 ft. wide.—*Dayton (Ohio) Journal.*

Edward Bascom, Niles, Mich., is president of the company.

Alabama Cement Industry Going Strong

THE cement industry, the third most important in the upper part of Alabama, is enjoying a very happy demand and the plants are working steadily. A large quantity of cement is being manufactured and shipment is holding up nicely. The Atlas Portland Cement Co., with big plant at Leeds, in the northeastern part of the county, has the bag factory in operation and when everything is running smoothly an annual production of upward 3,000,000 bags will be turned out. There are four cement plants around Birmingham and the traffic furnished the railroads is nothing short of marvellous. Train loads of cement leave the district daily. Propaganda in the interest of cement is strong, actual use of the commodity is proving most valuable to the trade. No dull time is anticipated, even during the wet season there being steady production and quick shipment of the product.—Leon W. Friedman in the *Montgomery (Ala.) Advertiser.*

Inspector Passes Cement for Fertilizer

ONE of the state fertilizer inspectors down in Union county, Ark., passed a sack of cement for perfectly good fertilizer, Senator Wilson, who is a candidate for the governor's seat, declared in comments on the departments of mines, manufactures and agriculture. He advocated the placing of feed and fertilizer inspection in control of the state agricultural schools, which would use the revenue from this source for the construction of buildings and laboratories. Also the inspection would be in competent hands and agricultural pupils be given opportunity for technical education.

War-Time Potash Plant Sells for $20,000

THE Standard Potash Co. plant at Lakeside, Neb., has passed into other hands by order of the federal court. Max Grimes of Denver was the successful bidder at $20,000. Upon confirmation of sale the various structures will be dismantled and the residences sold. This plant was originally organized by Omaha and Council Bluffs capital and was considered one of the best among the 19 plants in the potash fields of western Nebraska.

In the days of potash activity this plant with its immense buildings and numerous residences used for officers and employes was a veritable city within itself.—*Omaha (Neb.) World-Herald.*

Court Enjoins Township from Selling Its Rock Crusher

JUDGE EDWARDS, sitting in the circuit court, granted a writ for injunction to restrain A. H. Hill of the town board of Lee Center township, Ill., from disposing of a stone crusher which is said to belong to the township. It was learned that Hill acting in the interest of the township, found an opportunity to dispose of the crusher to a buyer in Earlville. It being considered useless in the township, the sale was agreed upon and the piece of machinery loaded on a car for shipment, when the injunction writ was granted.—*Earlville (Ill.) Leader.*

"Limestone Products"

UNDER the above title the Western Lime and Cement Co., Milwaukee, Wis., has issued a most interesting and instructive 24-pp. booklet, bound with a green silk cord and with a colored halftone cover. The rest of the book is on heavy plate paper with tinted borders and marginal sketches.

The foreward states: "As a token of thousands of business friendships and in the hope that our friends may be interested in a pictorial review of our plants, a brief description of processes and in the extended uses of our products, this pamphlet is submitted."

Besides views of all the various plants there are portraits of the officers, group portraits of all the plant superintendents and of the headquarters office force. The text covers in a popular, but quite comprehensive way, the entire process of lime manufacture and the uses of lime. Included with the views of each plant are group pictures of the entire plant crews.

Altogether, the booklet is a most acceptable souvenir; and is sure to prove helpful in increasing the popular respect for the lime industry. It ought also to help materially to build up and maintain a proper spirit of pride in their work and accomplishments on the part of the whole organization.

Survey of Florida Limestone and Marl Deposits

HERMAN GUNTER, state geologist, accompanied by his assistant, D. Stuart Mossom, has just returned from a trip through three west Florida counties, where they went to make an examination of limestones and marls. Excellent samples of limestones were obtained from Chattahoochee landing, Mr. Gunter stated, and samples of marls were taken in Calhoun county.

Marl is now being mined at Darling Slide on the Chipola river and is being used as a fertilizer. Darling Slide is the only place in west Florida where marl is mined. It is, however, being mined extensively in southern Florida for use as road material. It is used as a base and after treatment with a bituminous surface makes an excellent road, it is stated.

This material is found in almost inexhaustive quantities in certain sections of the state.

Westinghouse Now in Concrete Products Business

THE purchase of the Milwaukee plant of the Massey Concrete Products Corporation and the concrete post business by the George Cutter Co. of Indiana has just been announced by the Westinghouse Electric & Manufacturing Co. The Massey corporation has been engaged in the concrete-post industry, manufacturing the well-known line of "Hollowspun" reinforced-concrete, street-lighting standards and concrete poles for street railway service at the Milwaukee plant and the George Cutter Co. will now undertake the manufacturing of these products.

For a number of years, the Westinghouse company, through connections and relations with the George Cutter Co. has been engaged in the manufacture of cast-iron poles for industrial, ornamental and street-lighting purposes at the George Cutter Works at South Bend, Ind. The addition of the "Hollowspun" line to the line formerly manufactured assures the Westinghouse company a place among the foremost manufacturers in ornamental street-lighting equipment.

"Hollowspun" lighting standards which are made by the centrifugal process method demonstrate the possibilities of efficiently molding concrete. The tremendous force with which the concrete is tamped in the mould and around the reinforcement absolutely insures a uniform strength and surface texture throughout the length of the product.

The transfer of the Massey plant became effective July 1, and the Westinghouse company will handle the "Hollowspun" business through the George Cutter Works.

Atlas Portland Cement Co. Now Owner of "Tom Sawyer Cave"

SOME enterprising press agent has succeeded in getting the following story (illustrated in the original) in the "boiler-plate" section of the Pawhusk (Okla.) *Capital* and other local newspapers in the Southwest:

When Tom Sawyer "pushed his head and shoulders through a small hole and saw the broad Mississippi rolling by," as Mark Twain described its emergence of his immortal American boy from the cave in which he and his companion Becky had been lost for three days—Tom Sawyer probably stuck his head through a hole that is now on property upon which is located the large plant of the Atlas Portland Cement Co. at Hannibal Mo.

This town was made famous by the doings of Tom Sawyer, Huckleberry Finn and his associates, who were the boyhood recollections of Mary Twain, whose own youthful days were spent in that city on the banks of the Mississippi. The home Mark Twain occupied is still there, a modest white clapboard house with a small bronze plaque on its street side, stating that the house was the boyhood home of Mark Twain, and that the plaque had been set there by his father. Rising just beyond it is Cardiff Hill, the location of many of the pranks of the boys of Mark Twain's vigorous, virile imagination. One can still plunge in the "swimmin' hole," but the covered bridge has been neglected and is sorely in need of repairs.

More permanent and interesting still is the cave which became the haunt of the boys in their daredevil games of playing "Injun" and banditry. The entrance is in the side of a hill before which is a picturesque picnic ground, and so wide has been the knowledge of these underground passages through reading of Mark Twain's characters that the cave is constantly a mecca of visitors from all over the United States. A guide is always at hand a small fee is charged for being conducted through the caves. It is worth while to hear the guide tell of the incidents in the lives of Mark Twain's "boys" which took place in the windings of these limestone passages.

No better description of them could be had than in "The Adventures of Tom Sawyer" itself. A picnic had been arranged and a ferryboat hired for the occasion. After luncheon, somebody shouted: "Who's ready for the cave?"

"Everybody was," writes Mark Twain. "Bundles of candles were procured, and straightway there was a general scamper up the hill. The mouth of the cave was up the hillside—an opening shaped like a letter A. Its massive oaken door stood unbarred. Within was a small chamber, chilly as an icehouse, and walled by Nature with solid limestone that was dewy with a cold sweat. It was romantic and mysterious to stand here in the deep gloom and look out upon the green valley shining in the sun. But the impressiveness of the situation quickly wore off, and the romping began again. The moment a candle was lighted there was a general rush upon the owner of it; a struggle and a gallant defense followed, but the candle was soon knocked down or blown out, and then there was a glad clamor of laughter and a new chase. But all things have an end. By and by the procession went filing down the step descent of the main avenue, the flickering ranks of lights dimly revealing the lofty walls of rock almost to their point of junction 60 ft. overhead. This main avenue was not more than 8 or 10 ft. wide. Every few steps other lofty and still narrower crevices branched from it on either hand—for McDougal's cave was but a vast labyrinth of crooked aisles that ran into each other and out again and led nowhere. It was said that one might wander days and nights together through its intricate tangle of rifts and chasms and never find the end of the cave; and that he might go down and down, and still down, into the earth, and it was just the same—labyrinth underneath labyrinth, and no end to any of them. No man 'knew' the cave. That was an impossible thing. Most of the young men knew a portion of it, and it was not customary to venture much beyond this known portion. Tom Sawyer knew as much of the cave as any one."

Wisconsin Would Deal in Portland Cement

WISCONSIN cities and towns will be able to purchase cement for highway and other construction purposes at from 25 to 60 cents lower per barrel if plans now being worked out by the Wisconsin League of Municipalities are successful, according to Ford H. MacGregor, state secretary. Mr. MacGregor announced recently that a bill will be offered in the next legislature authorizing the state highway commission to sell cement to cities and towns.

Investigation of existing statutes shows that the state commission cannot do this at the present time, Mr. MacGregor said. A committee, headed by Alderman Hilker of Racine, is conducting further investigations into the proposition.

The state highway commission has expressed favor to the plan for purchasing of cement for cities. Under existing conditions, the state gets its highway cement at from 30 to 60 cents per barrel lower than commercial prices, it is said.—*Manitowoc (Wis.) Herald.*

Since there are no high calcium limestone deposits in Wisconsin, this socialistic community is prohibited by Nature from building a state-owned plant. However, they appear to be resourceful.—Editor.

Ohio Farmers Plan Lime Survey

THE West Lafayette (Ohio) Farmers' Institute Association, working through A. E. Halterman, secretary of the association and director of vocational agriculture in West Lafayette high school, will start a lime survey of the farms in the vicinity of West Lafayette within the next few days.

The survey is an outgrowth of the independent farmers' institute held at West Lafayette, last winter, when many of the farmers of the community pledged themselves to use lime on their farms the coming year.

Where desired one of the committees will make tests of soils by the new potassium thio-cyanate method. By means of a survey blank records of previous liming, kinds of lime used, nearest source of lime, and rotation used will be kept, and the number of tons of crushed limestone required per acre will be ascertained by the test.—*Coshocton (Ohio) Tribune.*

Indiana Wants Lower Rates on Agricultural Limestone

LEGAL AIDS of the Indiana State Chamber of Commerce and several prominent Indiana farmers appeared recently before the Indiana public service commission and asked a reduction in freight rates on crushed limestone to be used for fertilizer. Although some areas in Indiana have commodity rates on crushed limestone, the area is restricted. The petitioners pointed out that the crushed stone was used solely for the purpose of enriching the soil and that the present rates were prohibitive. It is not likely the commission will make any definite decision in the case until the middle or last of August. During the last two years the use of limestone as fertilizer has increased marvelously, according to officials of the agricultural experimental station at Purdue University, a state institution.

Vulcan Iron Works Takes Over Richard K. Meade's Lime Patents

THE Vulcan Iron Works of Wilkes-Barre, Penn., has secured control of the Meade patents for vertical lime kilns and the Zepp patents for an automatic continuous batch hydrator, and these machines hereafter will be exclusively manufactured by them. Both of these machines are the products of Richard K. Meade & Co. of Baltimore, Md., whose large experience in lime burning and kindred lines makes their design of machinery valuable on account of this experience. The Vulcan Iron Works are now prepared to quote on and build complete lime-burning and hydrating plants, using either the Meade vertical kiln or the Vulcan rotary kiln for lime burning.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 21:

Central Freight Association

8824. Lime. Woodville and Gibsonburg, Ohio, to Castalia, Ohio. Present, 12½ cents; proposed, 9½ cents.

8825. Crushed stone. Bluffton, Ohio, to Sidney, Ohio. Present, 90 cents per net ton; proposed, 70 cents per net ton.

8826. Lime. Woodville and Gibsonburg, Ohio, to St. Clairsville, Ohio. Present, 20½ cents; proposed, 16 cents.

8829. Stone, crushed, crushed stone screenings, tailings; also agricultural limestone (other than ground or pulverized agricultural limestone, fluxing stone, or raw dolomite, fire stone and silica rock or silica stone), in bulk. Greencastle, Ind., to Indiana. Present, 6th class basis; proposed, per net ton:

To	Proposed
Vincennes, Ind.	$1.26
Frichton, Ind.	1.26
Wheatland, Ind.	1.26
Hyatt's Spur (Dav. Co.), Ind.	1.26
Shops (Dav. Co.), Ind.	1.26
Washington, Ind.	1.26
Black Oak, Ind.	1.26
Montgomery, Ind.	1.26
Cannelburg, Ind.	1.26
Loogootee, Ind.	1.26
Martin (Martin Co.), Ind.	1.26
Shoals, Ind.	1.20
Willow Valley, Ind.	1.10
Huron, Ind.	1.10
Prosser Spur, Ind.	1.10
Georgia, Ind.	1.10
Riverdale, Ind.	1.10
Tunnelton, Ind.	1.10
Fort Ritner, Ind.	1.10
Sparksville, Ind.	1.26
Medora, Ind.	1.26
Vallonia, Ind.	1.26
Newport (Sand Bank Co.), Ind.	1.26
Brownstown, Ind.	1.26
Lehigh Spur, Ind.	1.26
Seymour, Ind.	1.26
Fleming, Ind.	1.26
Hayden, Ind.	1.26
Whitcomb (Jen. Co.), Ind.	1.26
North Vernon, Ind.	1.26
Butlerville, Ind.	1.35
Nebraska, Ind.	1.35
Holton, Ind.	1.35
Dubney, Ind.	1.35
Asgood, Ind.	1.35
Delaware, Ind.	1.35
Pierceville, Ind.	1.35
Milan, Ind.	1.35
Moores Hill, Ind.	1.35
Cold Springs, Ind.	1.40
Dillsboro, Ind.	1.40
Cockran, Ind.	1.40
Aurora, Ind.	1.40
Lawrenceburg, Ind.	1.40
Lovett, Ind.	1.35
Commiskey, Ind.	1.35
Paris, Ind.	1.35
Deputy, Ind.	1.35
Blocker, Ind.	1.35
E. Levington, Ind.	1.35
Nabbs, Ind.	1.35
Marysville, Ind.	1.35
Otisco, Ind.	1.35
Charlestown, Ind.	1.35
Gibson (Clark Co.), Ind.	1.35
Watson (Clark Co.), Ind.	1.35
Dyeton (Clark Co.), Ind.	1.35
Jeffersonville, Ind.	1.35

8843. Crushed stone. North Baltimore, Ohio, to Richville, Ohio (W. & L. E. delivery). Present, $1.10 per net ton; proposed, $1 per net ton.

8844. Crushed stone. Sandusky and North Baltimore, Ohio, to Howenstein, Ohio. Present, $1.10 from Sandusky and $1.20 per net ton from North Baltimore.

8877. Crushed stone. Spore, Ohio, to Fostoria, Ohio. Present, 60 cents per net ton; proposed, 50 cents per net ton.

8849. Glass and molding sand. James Siding and Franklin, Penn., to Pennsylvania, Ohio, New York, and West Virginia and Michigan points. Present and proposed. Glass and molding sand, carloads, from James Siding (Belmar) and Franklin, Penn., to destinations shown below:

FROM JONES SIDING (Belmar)

To	Proposed per net ton	Present per net ton
Aliquippa, Penn.	.....	$1.51
Monaca, Penn.	.....	1.51
Beaver Falls, Penn.	.....	1.51
Rochester, Penn.	$1.51	1.76
Braddock, Penn.	1.76	(*)
Homestead, Penn.	1.76	(*)
Monessen, Penn.	2.27	(*)
West Newton, Penn.	2.27	(*)
Washington, Penn.	1.76	(*)
Steubenville, Ohio	1.76	(*)
Wheeling, W. Va.	1.76	(*)
Bellaire, Ohio	1.76	(*)
Buffalo, N. Y.	1.35	(*)
Dunkirk, N. Y.	1.35	1.89
Erie, Penn.	1.35	1.89
Cleveland, Ohio	.....	1.76
Detroit, Mich.	.....	2.40
Meadville, Penn.	.....	1.26
Grove City, Penn.	.....	1.26

FROM FRANKLIN, PENN.

To	Proposed per net ton	Present per net ton
Aliquippa, Penn.	$1.51 (†)	$1.76
Monaca, Penn.	1.51 (†)	1.76
Beaver Falls, Penn.	1.51 (†)	1.76
Rochester, Penn.	1.51 (†)	1.76
Braddock, Penn.	1.76 (‡)	1.80
Homestead, Penn.	1.75 (‡)	1.80
Monessen, Penn.	2.27	(*)
West Newton, Penn.	2.27	(*)
Washington, Penn.	1.76	(*)
Steubenville, Ohio	1.76	(*)
Wheeling, W. Va.	1.76	(*)
Bellaire, Ohio	1.76	(*)
Buffalo, N. Y.	.....	1.89
Dunkirk, N. Y.	1.35 (‡)	1.39
Erie, Penn.	1.35 (‡)	1.39
Cleveland, Ohio	1.76 (‡)	1.80
Detroit, Mich.	2.40	(*)
Meadville, Penn.	1.26	(*)
Grove City, Penn.	1.26 (§)	1.39

(*) Sixth Class.
(†) Franklin to Pittsburgh.
(‡) Oil City to these destinations.
(§) Franklin to Butler.

8852. Crushed stone. Huntington, Ind., to Frankfort, Ind. Present, 19 cents; proposed, $1 per net ton.

8868. Lime, common, hydrated, quick or slaked. Marble Cliff, Ohio, to destinations east of western termini of eastern trunk lines.

To	Present cents	Proposed cents
Albany, N. Y.	27	28
Baltimore, Md.	25½	26
Belington, W. Va.	22	23½
Boston, Mass.	30½	31
Cumberland, Md.	22	23½
Hagerstown, Md. (via N. & W.)	25½	26
New York, N. Y.	28½	29
Newport News, Va.	25½	26
Norfolk, Va.	25½	26
Philadelphia, Penn.	26½	27
Rochester, N. Y.	20½	22
Rockland, Me.	30½	31
Strausburg, Va.	25½	26
Syracuse, N. Y.	22	23½
Utica, N. Y.	25	26½

8878. Cement. Fultonham, Ohio, to points on the Cincinnati, Georgetown & Portsmouth R. R. and Felicity & Bethel R. R. Present, combination basis prevails; proposed, to Bethel, Ohio, and intermediate points, 13 cents; to Felicity, Ohio, and intermediate points on the Felicity & Bethel R. R., 13 cents.

8901. Crushed stone. White Sulphur, Ohio, to Conneaut, Ohio. Present, Sixth class; proposed, $1.40 per net ton.

8904. Crushed stone and stone screenings. Annandale, Branchton, Harrisville, Osbornes and Wick, Penn., to Tidioute, Jamison, Tionesta and Titusville, Penn. Present, $1.60 per net ton to all points except Titusville, $1.40. Proposed, to Tidioute, Penn., $1.50; to Jamison and Tionesta, Penn., $1.40, and to Titusville, Penn., $1.20 per net ton.

New England Freight Association

6677. To establish commodity rates on lime and limestone, B. & A. R. R. lime shipping stations, viz., from Cheshire, Farnams, North Adams, Renfrew, Richmond and Zylonite, Mass., to New York City and Brooklyn, N. Y., deliveries via Chatham, N. Y., and N. Y. C. R. R. on same basis as now apply via Rensselaer, N. Y., and N. Y. C. R. R. Reason: To apply same rates via Chatham, N. Y., as now apply via Rensselaer.

6679. Sand, molding. Van Housen, N. Y., to Schenectady, N. Y., 5. Reason: To establish rate comparable to existing rate for similar service.

6727. Molding sand. Elnora, Reynolds, Schaghticoke, Schuylerville, Scotia, Saratoga Springs, Stillwater, Wayville and Ushers, N. Y., to Newark, N. J., and Newark, N. J., stations, 16 cents. Reason: To permit movement of traffic.

Illinois Freight Association

1495H. Cement. Carloads. To establish to Pekin and Crescent, Ill., the same rates as are published to Peoria, Ill., in Trf. I.F.A.T.B. 132C, from Buffington, Ind., Dixon, Ill., and LaSalle, Ill. Present,

To	From Buffington cents	From Dixon cents	From LaSalle cents
Pekin, Ill.	11½	9½	9
Crescent, Ill.	12½	11	9½
Peoria, Ill.	11½	9½	8½

2523A. Sand, gravel, and crushed stone. Carloads, minimum weight marked capacity of car. From Lincoln to Lewistown, Ill., sand and gravel—present, Class E; proposed, $1.34. From Thornton to Lewistown, Ill., crushed stone—present, Class E; proposed, $1.47.

2616A. Cement, hydraulic, natural or portland. Carloads. To revise the intermediate clause in W. T. L.; Trf. 132 series naming rates on cement to perpetuate the intermediate application in instances where rates may be published to and from and to specific points. Present, in instances where rates are published from certain origin points to certain destinations the present rule by its terms prohibits the continued intermediate application in connection with rates from other points to the same specific destinations.

2622. Stone, crushed. Carloads, minimum weight marked capacity of car, from Gary, Hawthorne, and McCook, Ill., to Murrayville, Ill. Present, $3 per net ton, Class E; proposed, $1.51 per net ton.

2624. Sand and gravel. Carloads, minimum weight marked capacity of car, from Cairo, Ill., to Southern Ry. stations, viz. Proposed, Albion, Ill., $1.40; Golden Gate, $1.40; Merriam, Ill., $1.26; Fairfield, Ill., $1.26; Simms, Ill., $1.26; Bluford, Ill., $1.26; Mt. Vernon, Ill., $1.26; Dix, Ill., $1.26; present, combination rates.

2642. Sand and gravel. Carloads, minmum weight 90% of the marked capacity of car, from Cairo, Ill., as follows (per net ton):

SAND

To	Present Inter state cents	Present Intra state cents	Proposed Inter state cents	Proposed Intra state cents
Texas City, Ill.	101	88	88	....
Gossett, Ill.	88	88	....	....
Norris City, Ill.	88	88	....	....
Brownsville, Ill.	88	88	....	....
Carmi, Ill.	88	88	....	....

GRAVEL

To	Present Inter state cents	Present Intra state cents	Proposed Inter state cents	Proposed Intra state cents
Texas City, Ill.	101	101	88	88
Gossett, Ill.	101	101	88	88
Norris City, Ill.	101	101	88	88
Brownsville, Ill.	101	101	88	88
Carmi, Ill.	101	101	88	88

2611. Sand and gravel. Carloads, minimum weight 90% of the marked capacity of the car, except when loaded to full visible capacity actual weight to govern.

To	Oregon	Proposed, cents Forreston	Sheridan	Ottawa
Galena	90	100	103	103
East Dubuque	.....	100	103	103
		Present, cents		
Galena	101	101	.....	.....
East Dubuque	90	.....	.....	.....

2648. Sand and gravel. Carloads, minimum weight 90% of the marked capacity of car, except when loaded to full visible capacity actual weight to govern, from Yorkville and Oswego, Ill., to Chicago, Ill., 65 cents per net ton, for delivery on C. B. & G. R. R. tracks only; no connecting line switching to be absorbed; to

North Aurora, Batavia, East Batavia, West Batavia, and West Chicago, Ill., 63 cents per net ton. Present, 76 cents per net ton.

1743. Sand. Carloads, as described below, carloads, minimum weight 90% of the marked capacity of car; except when car is loaded to full cubical or visible capacity, actual weight to apply, from Ottawa, Ill., Ohio River crossings applicable on traffic for southeastern and Carolina territory. Present, class rates; proposed, $2.07 per net ton on sand, other than blast, engine, foundry, glass, lake, molding or silica, $2.52 per net ton on sand, viz., blast, engine, foundry, glass, lake, molding or silica.

1747. Limestone, crushed, ground or pulverized. Carloads, from Mosher, Mo., to destinations in southern territory. Proposed, to amend rate basis No. 109 of Agent Speiden's Origin Bases Book No. 39 by providing for the following commodity description: "Lime, in packages or in bulk, and limestone, crushed, ground or pulverized, carloads." Present, combination rates.

Texas-Louisiana Tariff Bureau

5528-TX. Gravel. Carloads, from Hughes Springs or Daingerfield to Titus County, Spur, Tex. Proposition from carriers to establish on gravel for public highway construction rate of $21 per car on cars of 60,000 lb. capacity or over, from Hughes Springs, Tex., to Titus County, Spur (recently constructed spur located 16 miles west of Hughes Springs, Tex.).

6027-TX. Cement plaster. Carloads, rates on from Sweetwater and Pyramid, Tex., to El Paso, Tex. Proposition from shippers to establish rate of 17½ cents per 100 lb. on cement plaster, carloads, minimum weight 60,000 lb., from Sweetwater and Pyramid, Tex., to El Paso, Tex. Proposed rate to place Texas producing points on a parity with producting points in New Mexico.

Trunk Line Association

M474. To establish on cement, carloads, from all cement shipping points in Trunk Line territory, including Fordwick District, Universal and New Castle District, to points on Raquette Lake Ry., rates on basis of following arbitraries over the rates to Carter, N. Y.: To Eagle Bay, N. Y., 8 cents, and to Raquette Lake, N. Y., 11 cents. File 24108.

12133. To cancel commodity rates on lime, carloads, from Lexington, Va., to Washington, D. C., and Baltimore, Md., account of rates being obsolete. Class rates to apply.

Western Trunk Line

3969. Sand and gravel. Carloads, from Muscatine, Iowa, to Omaha and South Omaha, Neb. Present, 11 cents; proposed, $1.82 per net ton. Minimum weight, 90% of marked capacity of car, but not less than 40,000 lb. (By shipper.)

3592. Stone, crushed, and stone paving blocks. Carloads, from Jasper, Pipestone, and Quartzite, Minn., Sioux Falls and Dell Rapids, S. D., to St. Louis, Mo. Present, 26 cents per 100 lb. (Class D); proposed, 13½ cents per 100 lb. on crushed stone; 15 cents per 100 lb. on paving blocks. Minimum weight, 90% of marked capacity of car, except when car is loaded to full visible capacity actual weight will apply, but not less than 50,000 lb.

3386A. Lime. Carloads, from Port Byron, Ill., to Fort Dodge, Iowa. Present, 16 cents; proposed, 13 cents. Minimum weight, present, 30,000 lb.; proposed, 66,000 lb. (By shipper.)

3808Q. Stone, crushed. Carloads, from Felch, Mich., to Toronto and West Toronto, Ont., via across lake. Present, 41½ cents (6th class); proposed, 31 cents. Minimum weight, 40,000 lb. (Classification basis). (By shipper.)

3386B. Lime. Carloads. From Port Byron, Ill., to stations on the M. & St. L. R. R., in Iowa except (Angus, Berkley, Ogden, Wolf, Pilot Mound, South Dayton, Dayton, Burnside, Otho, Kalo and Fort Dodge, Iowa) and Minnesota. Present, class basis; proposed, Chicago rates as carried in M. & St. L. Tariff 1310-F, I.C.C. B-587, subject to combination of intermediate rates as maximum weight 30,000 lb. (By shipper.)

Southern Freight Association

14890. Slag. Carloads, minimum weight 90% of marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern, from Alabama City, Ala., and group, to Sylvania, Ga. Present rate, $2.82 per ton 2000 lb.; proposed, $2.30 per ton 2000 lb., made on basis of Alabama-Georgia proposed scale.

14893. Sand. Carloads, minimum weight marked capacity of car; except when cars are loaded to their visible capacity actual weight will govern, from Birmingham, Ala., and group, to New Orleans, La. Present rate, 12½ cents per 100 lb.; proposed, $1.94 per net ton. The proposed rate is made on basis of mileage scale on sand as published in So. Ry. I.C.C. A9720.

14895. Stone, rubble and crushed. Carloads, minimum weight marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern, from Holton, Ga., to Coreen, Ga. Present rate, $18.50 per car of 36,000 lb.; proposed, 90 cents per net ton. Proposed rate is made in relation to rate to Atlanta, Ga.

14901. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern, from Cincinnati, Ohio, Covington and Newport, Ky., to Lexington, Hamilton, Bryant, Elmendorf, Muir, Hutchinson, Kenney, Wright, and Paris, Ky. Present, 6½ cents per 100 lb. ($1.30 per net ton). It is proposed to establish rate of $1.25 per ton 2000 lb., made the same as in effect from Louisville, Ky.

14927. Initiated by shippers; rates suggested by carrier. Slag. Carloads, minimum weight 30 net tons, but not in excess of marked capacity of car, from Woodward, Ala., to Lanett, Ala. Present rate, 27 cents per 100 lb. (Class "A"); proposed, $1.35 per net ton, same as from Bessemer, Birmingham, and Ensley, Ala., to Lanett, and same as from Birmingham Group to West Point, Ga.

14931. Initiated by shipper. It is proposed to cancel rate of $2.14 per net ton on crushed stone, carloads, from Mascot, Tenn., to Savannah, Ga., published on page 64 of So. Ry. I.C.C. A-9649, and in lieu thereof, apply rate of $1.98 per net ton authorized in So. Ry. Tariff I.C.C. A-9720.

14937. Initiated by shipper. Crushed stone. Carloads, from Stockbridge, Ga., to Augusta, Ga. Present, $1.72; proposed, $1.62 per net ton, based on the joint mileage scale for distance of 190 miles, submitted by carriers to the Georgia and Alabama Public Service Commissions.

14938. Initiated by shippers; rates suggested by carriers. It is proposed to establish rates on sand and gravel, carloads, as follows: 1. From Arundel Siding, Old Dominion Siding and Ellerslie, Va., to Lynchburg, Va., $1.25 per ton 2240 lb., same as present rates in effect from Petersburg, Va. (via A. C. L. R. R.), and Puddledock, Va. (via N. & W. Ry.), to Lynchburg, Va. 2. To revise rates to Norfolk So. R. R. stations (as named below) on basis of 60% of Class L rate prior to June 24, 1918, from Richmond, South Richmond, and Petersburg, Va., to said points, increased 1 cent per 100 lb., general order No. 28, 25% under Ex Parte 74, and reduced 10%, July 1, 1922. Rates from Arundel Siding, Old Dominion Siding, and Ellerslie, Va., to be made the same as from Richmond, Va., and Petersburg, Va.; the proposed rates being: To N. S. R. R. stations, James City, N. C., to Morehead City, N. C., to Oriental, N. C., inclusive, $1.60 per net ton. The proposed revision represents both advances and reductions.

14947. Initiated by shippers; rates suggested by carriers. It is proposed to establish commodity rates on agricultural stone (ground limestone) and crushed stone, carloads, from Carterville, Ga., to L. & N. R. R. stations, in line with rates from and to other points on the L. & N. R. R. for similar distances. At present, Class A rates apply; proposed rates to representative points are: Kingsley, Tenn., $1.30; Athens, Tenn., $1.30; Oldfort, Tenn., $1.20; Tennga, Tenn., $1; Ducktown, Tenn., $1.40; Murphy, N. C., $1.40 per net ton.

14960. Crushed stone. Carloads, from Ladds, Ga., to Belzoni, Miss. Lowest combination now applies. Proposed, $2.70 per net ton.

14961. Limestone, ground or pulverized. Carloads, from Ladds, Ga., to Montgomery, Ala., lowest combination now applies. Proposed, $1.94 per net ton, based on the proposed Georgia scale, less 10% for the short line workable distance.

14998. Sand and gravel. Carloads, from Montgomery, Ala., to Madison, Fla. Present rate, $2.92 per net ton; proposed, $1.89 per net ton, same as present rate to Lake City, Live Oak, and Jacksonville, Fla., proper.

Southwestern Freight Bureau

1585. Chert and slag. To establish on chert and slag, straight or mixed carloads, from Woodward, Ala., to points in Louisiana shown on page 35 of Sup. 29 to Agt. Speiden's Louisiana Trf. No. 96B, same rates as from Birmingham, Ala., and other points in Birmingham group. It is contended that since Woodward is in the Birmingham district it is entitled to the same rate as in effect from other points in that district.

1612. Cement. To establish rate of 29½ cents per 100 lb. on cement, except asbestos and mortar color cement, carloads, minimum weight 50,000 lb., from Ada, Okla., to Richland, Tex. As this rate is in effect to points on both sides of Richland it is contended it should also be applied to the latter point.

Iola Joins Rate Case

THE Iola Portland Cement Co. has been granted the privilege to become a party to the freight rate suit filed by the Iola Cement Mills Traffic Association against Kansas railroads. But in granting this privilege the state public utilities commission, before whom the the case is pending, specified that the company will not be permitted to introduce testimony which would tend to broaden the scope of the case. The Iola company was not a member of the association, which includes virtually all the other large cement mills of southeastern Kansas.

The commission has put up the bars against this case taking in any more territory. It started as a rate controversy involving a short haul from Bonner Springs to Kansas City, and has been extended from time to time to five states. Because of the interstate nature of the case a representative of the U. S. Interstate Commerce Commission has been cooperating with the commission in hearings already held.

No Chance to Starve in Los Angeles, California

WE have never seen it noted in print, but Los Angeles, Calif., might be called the "city of barbecues." Practically every Sunday out there some enterprising real estate developer advertises a free-for-all barbecue, to insure a crowd. It has now become the custom to open sand and gravel plants with barbecues, for specially invited guests, in this case, however.

Los Angeles papers recently carried stories of the opening of the Union Rock Co.'s new plant, described in this issue, with a barbecue at which were 1500 guests.

Not to be outdone a competitive producer comes out in less than a week with the following announcement:

"More than 3000 persons are expected to attend a barbecue tomorrow at the plant of the Los Angeles Rock and Gravel Co., at El Monte. The affair is to mark the opening of the company's bunkers there.

"Speakers will include Dist. Atty. Keyes and Mayor Ranger of El Monte. Entertainment will consist of music by Harold Brown's orchestra and vaudeville stunts. Guests will also be invited to inspect the private railroad which extends from El Monte to their Baldwin Park rock crushers.

"In connection with the opening of the new crushers the company announces it will make a present of 1000 pounds of sand suitable for a kiddies' playground to any family with children. The sand may be obtained at any of the plants located at El Monte, Baldwin Park, the Arroyo Seco and Culver City. The company will also deliver one or more loads of sand to any charitable institution in Los Angeles and vicinity.

"The celebration is receiving the co-operation of the El Monte Chamber of Commerce."

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.35	1.35	1.25	1.25	1.25	.....
Columbia, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	.....	.....
Northern New Jersey	1.50	1.50	.....	1.50	1.50	1.40
Prospect, N. Y.	1.00	1.40	1.30	1.25	1.25	.....
Walford, Pa.	.....	.....	.....	.....	1.60b	.....
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.50	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.80	.....	1.25	1.05	1.10	1.10
Cypress, Ill.	1.10@1.30	.....	.....	.....	.....	.....
Dundas, Ont.	.90	1.10	1.10	1.05	1.00	1.00
Gary, Ill.	1.10	1.40	1.10	1.10	1.10	1.10
Greencastle, Ind.	1.25	1.25	1.05	1.05	1.05	1.05
Krause, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern Wisconsin	.50@1.75	.....	1.00	.90	.90	.....
River Rouge, Mich.	1.00	1.00	1.00	1.00	1.00	1.00
St. Vincent de Paul, P. Q.	.75	1.25@1.45	1.10	1.00	1.00	1.00
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.20	1.10	1.05	.....
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Valmeyer, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
Youngstown, Ohio	.....	.....	.....	1.50	1.60	1.60
SOUTHERN:						
Alderson, W. Va.	.75	1.75	1.75	1.60	1.50	.....
Bridgeport and Chico, Texas	1.00@1.25	1.50@1.60	1.30@1.40	1.25@1.35	1.25@1.35	1.25@1.30
Cartersville, Ga.	1.75	1.50	1.50	1.00	1.00	1.00
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Graystone, Ala.			Crusher run with fines out, 1.00 per net ton			
Graysville, Ga.	1.00	1.25	.....	.85@1.00	.85@1.00	.....
Russellville, Ala.	1.25	1.25§	1.50a	1.15§	1.00a	1.00
WESTERN:						
Atchison, Kans.	.50	.....	2.00	2.00	2.00	1.60‖
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
Cypress, Ill.	1.00@1.10	.....	.....	.....	.....	.....
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.35@1.40	1.35@1.40
El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
E. Summit, N. J.	1.50	2.00	1.80	1.40	1.40	.....
Eastern Maryland	1.10	1.75	1.70	1.60	1.50	1.50
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.75	1.70	1.60	1.50	1.50
Meriden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60	1.35	1.15	1.00	1.00
Northern New Jersey	1.50@1.60	1.40@2.00	1.40@1.80	1.40	1.40	1.40
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	1.60	2.00	2.00	1.60	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.	.50	.....	2.00	1.50@2.00	.....	.....
Eastern Penna.—Sandstone	1.25	1.65	1.60	1.40	1.40	1.25
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	2.00	1.75	1.25	1.25	1.25
Lohrville, Wis.	1.65	1.65@1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.50	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	.....

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ‖Rip rap per ton. §Dust in. (a) Dust out. (b) less 10c 15 days.

Agricultural Limestone
(Pulverized)

Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk 3.50

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk 2.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

Rockdale, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

West Stockbridge, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk 3.00

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 100% thru 4 mesh; 80 lb. paper sacks, 5.00; bulk 3.50

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ..... 2.10@ 2.25

100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk 3.50

100% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Mayville Wis.—59.8% thru 60 mesh 2.35

Cartersville, Ga.—Pulverized limestone 1.75

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.75; bulk 2.50

Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton 2.00

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh ..... 1.50@ 2.00

Independence, Mo.—Analysis, 94.6% $CaCO_3$, 1.05% $MgCO_3$; 90% thru 10 mesh 1.25

Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Blackwater, Mo.—95% $CaCO_3$; 100% thru 8 mesh 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh 1.50

Alton, Ill.—Analysis 99% $CACO_3$; 100% thru 4 mesh 1.75

Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 100 mesh 1.10

Cypress, Ill.—Analysis, 90 to 96% $CaCO_3$; 90% thru 100 mesh and thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh 1.90

Kansas City, Mo.—50% thru 100 mesh 1.25

Krause, Columbia and Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.10

Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh (meal) bulk	1.60
32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% 4 mesh (screenings) bulk	1.25
Milltown, Ind.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 28% thru 100 mesh, 34.4% thru 50 mesh	1.35@ 1.50
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Bridgeport, Texas:	
Screenings from ⅛ in. down to flour	1.50
Chico, Texas:	
Screenings from ⅛ in. down to flour	1.50
Alderson, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass:	
6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.50@ 1.75
Grays Summit and Klondike, Mo.	2.00
Mapleton, Penn.	2.00@ 2.25
Mapleton Depot, Penn.	2.25@ 2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Mineral Ridge, Ohio	2.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry	4.00
Damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.50@ 3.00
South Vineland, N. J.—Damp	1.75
Dry	2.25
Thayers, Pa.	2.25
Utica, Ill.	1.25 1.40
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y.:	
Core	1.50
Molding fine, brass molding	2.25
Molding coarse	2.00
Sand blast	4.00
Arenzville, Ill.:	
Core	.75
Molding fine	1.40@ 1.60
Brass molding	1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Columbus, Ohio:	
Core	.25@ .35
Furnace lining	2.00@ 2.50
Molding fine	1.50@ 2.00
Molding coarse	1.50@ 1.75
Sand blast	3.50@ 5.00
Stone sawing	1.50
Traction	.25@ 1.00
Brass molding	2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	1.15	.85	.85	.85
Attica, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Penn.		1.00*	1.50*		2.00*	
Farmingdale, N. J.	.58	.48	.75	1.10	1.10	
Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Leeds Jct., Maine		.50	1.75		1.35	1.25
Machias, N. Y.	.75	.75	.75	.75	.75	.75
Northern New Jersey		.60	1.25	1.25	1.25	1.25
Pittsburgh, Pa., and vicinity	1.25	1.25	.85	.85	.85	.85
Washington, D. C.—Rewashed, river		.85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.		.70		.60	.60	
Columbus, Ohio	.85	.85@1.20	.85@1.00	.75@ .90	.75	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Eau Claire, Wis.	.40	.40	.85@1.25			.85
Elkhart Lake, Wis.	.50	.40	.40	.50	.50	.50
Ft. Dodge, Iowa		1.05	2.05		2.05	
Grand Rapids, Mich.		.50		.80	.70	.70
Hamilton Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.50@ .60	.50@ .60	1.35@1.55	1.35@1.55	1.35@1.55	1.35@1.55
Mankato, Minn.		.40	.40		1.25	
Milwaukee, Wis.	1.01	1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.	.35	.35	1.35	1.35	1.35	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Riton, Wis.	.40	.20			.40	
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65§	1.45		1.45¶
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.75	.90	.90	.85
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .58 pit			
Zanesville, Ohio	.70	.60	.60	.60	.90	.90
SOUTHERN:						
Brookhaven, Miss., Roseland La.		.50	1.35			
Charleston, W. Va.	all sand 1.37 f.o.b cars		all gravel 1.47 f.o.b. cars			
Estill Springs, Tenn.	1.00	.90			.85	.85
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.50	.50		.75	.75	.75
New Martinsville, W. Va.	1.00	.90		1.20		.90
WESTERN:						
Baldwin Park, Calif.		.25@ .35			.50@ .75	
Crushed rock	.90@1.10	.60@ .90	.60@ .90	.60@ .90	.60@ .90	
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.	.70	.70	1.10@1.15		1.10@1.15	
Pueblo, Colo.	1.10*	.90*		1.75*		1.60*
San Diego, Calif.	50@ .65	.80@ .90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*
Webb City, Mo.	.75	.75	.25@ .75b	.85b	1.25c	1.15c

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.	.75	.50			1.25	
Dudley, Ky.‡	1.05	1.05		.95		
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.80		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas		.95				55
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Zanesville, Ohio	.60	.60				

*Cubic yd.; §⅝ in. and less; ‡crushed rock; ¶2½ in. and less; (a) ¾ in. and less; (b) flint chats; (c) crushed flint.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.:	
Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Eau Claire, Wis.:	
Roofing sand	3.00@ 4.00
Sand blast	3.00@ 3.25
Core	1.25
Elco, Ill.:	
Ground silica per ton in carloads	20.00@31.00
Grays Summit and Klondike, Mo.:	
Molding fine	1.75@ 2.00
Joliet, Ill.:	
No. 2 molding sand and loam for luting purposes; milled	.85
Bank run	.65
Kasota, Minn.:	
Stone sawing (green)	1.50
Mapleton, Pa.:	
Molding fine, sand blast	2.00
Mapleton Depot, Pa.:	
Molding coarse, roofing sand	2.25
Molding fine	2.50
Traction	2.00@ 2.25
Massillon, Ohio:	
Molding fine, coarse, furnace lining and core, traction, stone sawing	2.50
Mineral Ridge and Ohlton, Ohio:	
Core (damp)	1.90
Furnace lining, roofing sand, stone sawing, traction (green)	1.75
Molding fine and coarse (green)	2.00
Montoursville, Pa.:	
Core	1.25@ 1.50
Traction	1.25
New Lexington, Ohio:	
Roofing sand	2.00
Molding coarse	1.50
Ottawa, Ill.:	
Crude silica sand	.75@ 1.00
Core, furnace lining, steel molding	1.50
Roofing sand	1.50@ 4.50
Sand blast	4.50
Ottawa, Minn.:	
Crude silica sand	.75@ 1.00
Pacific, Mo.:	
Core, furnace lining	1.00@ 1.25
Molding fine	.90@ 1.00
Stone sawing	1.00@ 1.75
Molding coarse	.85@ 1.00
Ridgway, Pa.:	
Core	2.00
Furnace lining, molding fine, molding coarse	1.25
Traction	2.25
Rockwood, Mich.:	
Roofing sand	3.00
Sand blast	3.75
Round Top, Md.:	
Roofing sand	2.25
Traction	1.75
St. Louis, Mo.:	
Core	1.00@ 1.75
Furnace lining	1.50
Molding fine	1.50@ 2.50
Molding coarse	1.25@ 1.75
Roofing sand	1.75
Sand blast	3.50@ 4.50
Stone sawing	1.25@ 2.25
Traction	1.25
Brass molding	2.00@ 3.00
San Francisco, Calif.:	
(Washed and dried)—Core, molding fine, roofing sand and brass molding (Direct from pit)	3.00@ 3.50
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	.....	1.25	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	.....	1.45	1.45	1.45	.....
Jackson, Ohio	.....	1.30	.....	1.30	1.30	1.30	.....
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	.....	1.55	.....	1.55	1.55	1.55	.....
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.30
Lime Ridge, Pa.	.....	.....	.....	.....	.....	.....	5.00a	.....
Williamsport, Pa.	.....	.....	10.00	.....	.....	.....	6.00	.....
York, Penn.	.....	10.50	10.50	11.50	.....	.....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio	.....	10.50	10.00	.....	9.00	.....	10.00	.....
Gibsonburg, Ohio	12.50	.....	10.00	.....	9.00	11.00	10.00	.....
Huntington, Ind.	.....	9.50	9.50	.....	9.00	.....	8.50	1.60b
Marblehead, Ohio	.....	9.50	9.50	.....	.....	.....	8.50	1.60c
Marion, Ohio	.....	9.50	9.50	.....	.....	.....	8.50	1.60c
Mitchell, Ind.	.....	12.00	12.00	12.00	11.00	.....	10.00	1.70e
Tiffin, Ohio	.....	.....	.....	.....	9.00	.....	.....	.....
White Rock, Ohio	12.50	.....	.....	.....	9.00	11.00	.....	.....
Woodville, Ohio	12.50†	9.50†	8.50†	.....	9.00	.....	9.00	1.60
SOUTHERN:								
Erin, Tenn.	.....	.....	.....	.....	.....	.....	8.50	1.40*
El Paso, Texas	.....	.....	.....	.....	.....	.....	9.00m	1.50
Graystone and Wilmay, Ala.	12.50	11.00	.....	11.00	.....	.....	8.50	1.50
Varnons, Ala. (f)	11.00	11.00	11.00	11.00	9.50	.75d	8.50	1.50
Zuber and Ocala, Fla.	14.00	12.00	10.00	.....	.....	.....	11.00	1.60
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	12.50h	.....
San Francisco, Calif.	22.00	22.00	15.00	22.00	.....	.....	.....	2.50
Tehachapi, Calif.	.....	.....	.....	.....	.....	.....	15.00	2.25

*And 1.50; †50-lb. paper bags; (a) F. O. B. Kilns; (b) wooden bbl.; (c) wooden, steel 1.70; (d) 90-lb. bag; (e) 180-lb. wooden bbl.; (f) dealers' prices; (g) to 12.00; (h) to 15.00; (i) 180-lb. bbl.; 2.65, 280-lb. bbl.

Miscellaneous Sands

(Continued)

Tamalco, Ill.:	
Molding coarse	1.40@ 1.60
Brass molding	1.75
Tamms, Ill.:	
Ground silica per ton in carloads	20.00@31.00
Thayers, Pa.:	
Core	2.00
Molding fine and coarse	1.50
Traction	2.00
Utica, Ill.:	
Core (crude and dry)	.75@ 1.25
Furnace lining	1.25@ 2.00
Molding fine	.75
Molding coarse	.85
Roofing sand (fine and coarse)	1.25@ 2.25
Sand blast	2.25
Stone sawing	1.25@ 2.25
Traction	1.25
Brass molding	1.25
Warwick, Ohio:	.....
Core, molding fine and coarse (all green) 1.75; all dry	2.50
Traction	2.50
Furnace lining, brass molding (green)	1.75
Zanesville, Ohio:	
Sand blast	2.50
Core	2.00
Molding fine	1.75
Molding coarse	1.50@ 1.75
Furnace lining	2.00
Traction	2.00
Brass molding	1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel workers' crayons, per gross	1.25
Chatsworth, Ga.:	
Crude	4.50
Ground (20-50 mesh), bags extra	6.50
Ground (150-200 mesh), bags	8.00@10.00
Chester, Va.:	
Crude talc, per ton	4.00
Ground talc (150-200 mesh), bulk ton	7.50@ 9.00
Bags	8.50@10.00
E. Granville, Rochester, Johnson, Waterbury, Vt.:	
Ground talc (20-50 mesh) bags	7.00@10.00
Ground talc (150-200 mesh) bags	10.00@25.00
Pencils and steel workers' crayons, per gross	.75@ 2.00
Emeryville, N. Y.:	
(Air floated)—325 mesh, CL	14.75
LCL, bags included	15.25
Gouverneur, N. Y.:	
Ground, in bags, f. o. b. cars	15.00@22.00
Henry, Va.:	
Crude talc (mine run) per 2000-lb. ton	3.00@ 4.00
Ground (150-200 mesh), bags	8.75@14.00
Keeler, Calif.:	
(150-200 mesh); carloads, 60,000 lbs. (bags extra)	20.00@30.00
Marshall, N. C.:	
Crude	4.50
Ground (20-50 mesh), bags extra	6.50
Ground (150-200 mesh), bags	8.00@10.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), 200-lb. bags	13.00@15.00
Waterbury, Vt.:	
Ground talc (20-50 mesh), bulk (Bags extra)	7.50@10.00
Ground talc (150-200 mesh), bulk (Bags extra)	10.00@22.50
Pencils and steel workers' crayons, per gross	1.20@ 2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%, bags	8.50
Bulk	6.50
Gordonsburg, Tenn.—B.P.L. 68-72%.	5.00@ 5.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	5.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Mt. Pleasant, Tenn—B.P.L. 72%; per 2000 lb. ton	5.50@ 6.00
Twomey, Tenn.—B.P.L. 65%	6.50@ 7.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.25
70% min. B.P.L.	2.50
72% min. B.P.L.	2.75
75/74% B.P.L.	3.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.00@22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	21.00@23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		7.00
Easton, Pa.—Slate granules		6.50
Haddam, Conn. — Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk. marble (crushed, in bags	14.50@22.50	14.50@22.50
Ingomar, Ohio (in bags)		6.00@25.00
Middlebrook, Mo.—Red		25.00@30.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—2000 lb.		12.00
Wauwatosa, Wis.		20.00@30.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 100 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@32.00
Ensley, Ala. ("Slagtex")	12.50	33.50
Friesland, Wis.	22.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	14.00	20.00
Portland, Ore.	21.00	30.00@60.00
Prairie du Chien, Wis.	14.00	22.00@28.00
Puyallup, Wash.	20.00	30.00@90.00
Rapid City, S. D.	18.00	25.00@40.00
Salem, Ore.	23.00	50.00
Seattle, Wash.	22.00	40.00
Wauwatosa, Wis.	14.00@15.00	28.00@75.00
Winnipeg, Can.	15.50	

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.00
Lancaster, N. Y.	13.50
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	13.00
Plant City, Fla.	10.00@15.00
Portage, Wis.	15.00
Rives Junction and Saginaw, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Tex.	12.50@13.50
Syracuse, N. Y. (delivered at job)	15.00@16.00
F.o.b. cars	18.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	22.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.60	22.60
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.35
Boston, Mass.	.....	2.63@3.03†
Buffalo, N. Y.	.....	2.48@2.88†
Cedar Rapids, Iowa	.60	2.44
Cincinnati, Ohio	.61¼	2.47
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.59¼	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	2.40
Duluth, Minn.	.54¾	2.19
Indianapolis, Ind.	.60¼	2.41
Kansas City, Mo.	.54¼	2.37
Los Angeles, Cal. (less 5c dis.)	.60	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	1.90b
New Orleans, La.	.....	2.40
New York, N. Y.	.....	2.25@2.65†
Philadelphia, Pa.	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Pa.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Toledo, Ohio	.61¼	2.45

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.
(b) Less 10c 20 days.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.10
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Northampton, Pa.	.....	1.95
Phoenix, Ariz.	.....	4.30†
Steelton, Minn.	.50	2.00
Universal, Pa.	.48¾	1.95

*Gross, 10c sacks and 10c per bbl. disc 10 days.
†Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	¾x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ¾x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Agatite, Texas (a)	.....	.....	6.00	10.00	10.00	10.50	10.00	.....	19.00	.....	.....	.....	.....
Akron, N. Y. (a)	3.00	4.00	6.00	10.00	10.00	10.00	20.20	7.00@9.00	27.35	21.00	19.375	20.00	30.00@32.00
Black Hawk, S. D.	3.50	.....	7.00	10.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kans. (a)	2.50	4.00	6.00	10.00	10.00	10.50	10.00	.....	23.15	19.00	19.375	20.00	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	6.00	.....	15.00	.....	.....	.....	.....	15.50	.....	.....	.....
Ft. Dodge, Iowa (a)	2.50	4.00	6.00	10.00	10.00	10.50	13.45	.....	22.70	20.00	19.375	20.00	30.00
Grand Rapids, Mich.	2.75	.....	6.00	10.00	10.00	10.00	.....	.....	.....	.....	.....	.....	.....
Gypsum, Ohio (a)	2.75	4.00	6.00	10.00	10.00	10.00	19.25	7.50	26.85	19.00	19.375	20.00	30.00
Port Clinton, Ohio	3.00	4.00	6.00	8.00	10.00	10.00	.....	7.50	30.15	.....	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	12.00	12.00	15.40†	.....	.....	16.40‡	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags $1.50 per ton extra (not returnable).
†CL.; LCL., $16.50; ‡finishing, CL.; LCL., $17.50; (a) prices are net of bags.

New Machinery and Equipment

Speed Reducer Performance in Plant of the New Egyptian Portland Cement Co.

By H. A. SPARROW, M. E.
Of the Robert June Engineering Management Organization of Detroit

IN CEMENT plants where cement dust, grit and dirt are found in excessive amounts, the machinery in the plant has to run under the worst of working conditions. In order to maintain stiff production schedules under these conditions, the machinery and equipment must be designed so that it will do heavy duty work and operate continuously with the least amount of shut-downs and production delays possible.

The plant of the New Egyptian Portland Cement Co., Port Huron, Mich., is

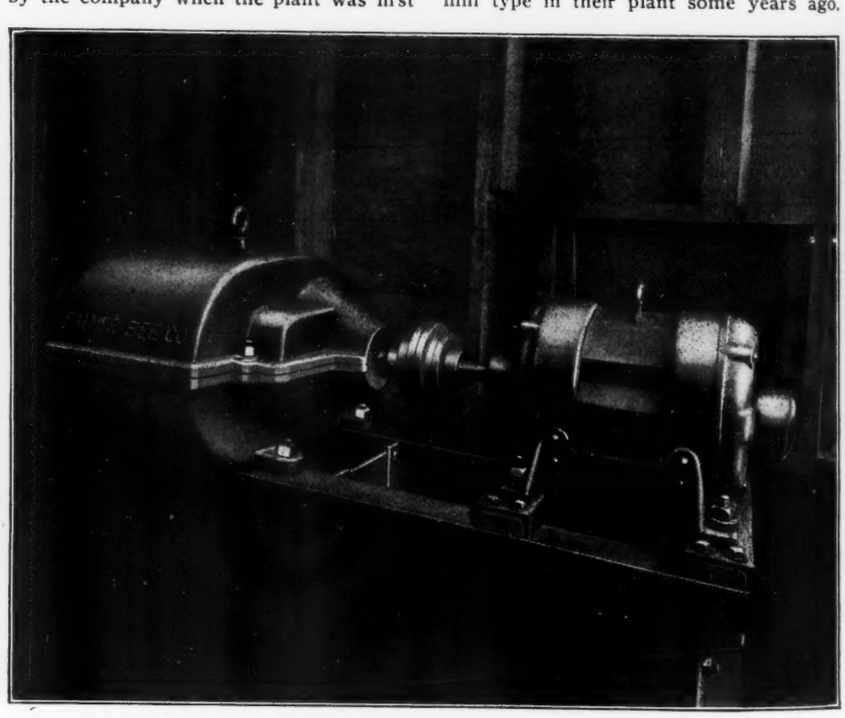
Speed reducer showing cover removed

an excellent example of an efficiently operated cement plant, where continuous heavy production is successfully maintained. The plant is ideally located with regard to raw materials, market and transportation facilities. Detroit and the nearby counties are spending many millions of dollars annually on paving and road construction work. As a result there is a continuously heavy demand for the products of the New Egyptian Portland Cement Co. As a matter of fact, the company is regularly operated on the basis of producing 17 carloads of cement a day.

One of the biggest factors in the continuous dependable operation of the plant is the use of speed reducers with direct motor drive in place of open gearing, pulleys, belts and similar power-transmission systems, which has in the past been extensively employed for operating massive and slow moving equipment. Realizing that many machine breakdowns are primarily due to the failure of open gearing, pulleys, etc. exposed to accident hazard and the danger of not being lubricated, the New Egyptian company drives its clinker grinding machines, coal pulverizers, conveyors and elevators through the medium of speed reducers.

Reducer installation New Egyptian Portland Cement Co., Port Huron, Mich.

Speed reducers were not generally used by the company when the plant was first constructed, but because of their dependability and greater safety the company installed several speed reducers of the mill type in their plant some years ago.



Reducer driving coal conveyors New Egyptian plant

These worked so satisfactorily that additional equipment of this sort was purchased from time to time so that at present there are 15 speed reducers in service in different parts of the plant—all giving good results. The units vary in size according to the service for which they are utilized.

The speed reducers which play such a prominent part in the New Egyptian Portland Cement Co.'s production program are of simple construction. They are fully enclosed by a housing which is split on the center line and by removing four bolts the cover can be lifted off and the entire inner mechanism which is carried in the lower half of the casing, is open to inspection.

The reduction gears are all cut gears of the wide faced, coarse pitch involute type and the shaft on which the gears are mounted is a through shaft supported by two bearings, one on each end. The gears run in oil and the bearings are lubricated automatically which assures constant flooding of all moving parts with lubricant without the use of grease or oil cups.

All the reducers are subject to extremely dusty conditions, due to an excessive amount of cement dust and dirt found in all mills making cement and pulverizing their own coal. These conditions alone show the wide range of adaptability that the enclosed type of reducer has in this field over the open gearing, pulley or belt systems.

The reducers in this plant have stood up well under the working conditions present, very little trouble being experienced with them. Since their installation only one unit out of fifteen caused any trouble and that was a unit which was running very close to the discharge end of a kiln where it was subject to very intense heat at all times. After careful adjustment and keeping it well filled with oil this trouble was eliminated.

The advantages of the speed reducer in the cement plant generally may be outlined as follows:

1. *Dependability:* Render 100% service, first, last and all the time. No breakdowns such as may occur with open gearing, pulleys, etc., exposed to accident hazards and danger of not being lubricated.

2. *Maintain production schedules:* Eliminate production delays. Keep machinery in continuous operation, thereby saving labor and materials and increasing production profits.

3. *Cut erection costs:* Speed reducers can be installed in a small fraction of the time required for open gearing, pulleys, belts, etc.

4. *Cut maintenance costs:* Speed reducers require little maintenance as compared to open gearing, pulleys, belts, etc., which are exposed to grit, dirt and accident hazards.

5. *Cut down attendance:* Speed reducers are self-contained. They cannot get out of order in the way that open gearing, pulleys, and belts can. They require change of oil only two or three times a year.

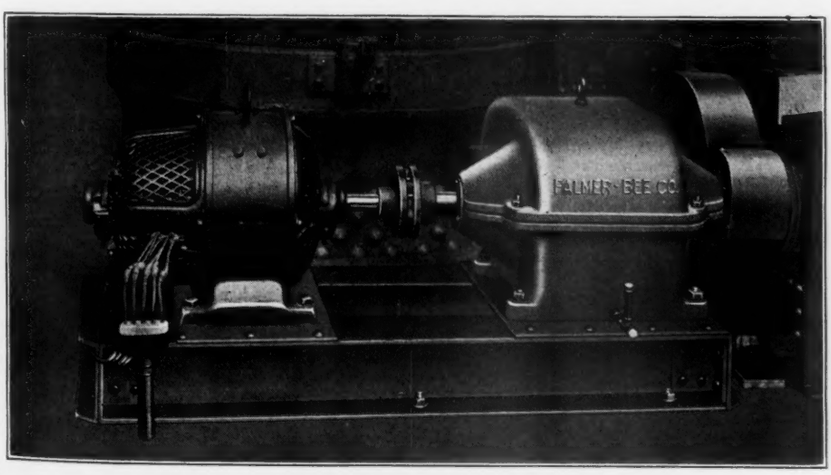
6. *Increase power efficiency:* Friction losses are cut to a minimum. Saving in power alone becomes an appreciable factor with speed reducers.

7. *Assure safety:* Open gearing, pulleys, belts, etc., are a source of danger to attendants. Speed reducers protect workers.

8. *Cut lubrication costs:* Speed reducers require only ¼ to ⅓ of the oil necessary for proper lubrication of open gearing, pulleys, etc.

9. *Save Space:* Much more compact than open gearing, pulleys, etc. This enables placing a considerably greater number of machines in the same floor space.

That the cement plants of the country are alive to the advantages of the speed reducer are shown by the increasingly large number of installations of this type of equipment, for both old and new work.

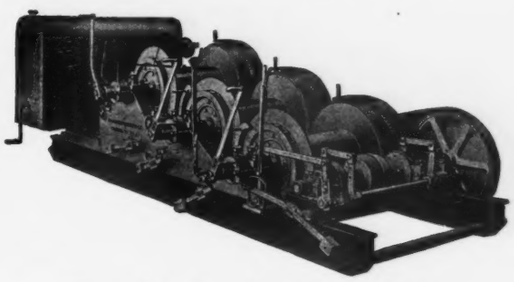


Reducer unit showing steel base, coupling, and motor drive New Egyptian Cement Co.

The illustrations accompanying this article are furnished through the courtesy of the Palmer Bee Co., Detroit, Mich.

Heavy-Duty Three-Drum Geared Hoist

THE O. K. Clutch and Machinery Co., Columbia, Penn., has recently placed on the market a new heavy-duty three-drum geared hoist with boom swinger. This hoist comes equipped with a 50-hp. gasoline engine, but can be had with electric motor and drum controller. It is said to be particularly adaptable to dragline work, operation of derricks, etc.



Heavy-duty three-drum geared hoist

The manufacturer's specifications state that: The side stands and cross-connecting sections are of extra heavy and wide box-type construction and are made of semi-steel. Sections are interchangeable. All main bearings are extra large babbitted, of the split type and adjustable for wear. All drum shafts, also driving shafts, are turned and ground and are extra heavy. They are fitted in extra large bearings. The thrust end of the drum shaft is threaded and fitted with a steel screw collar, which holds the end thrust ball bearing in place.

The hoist is equipped with the standard V type design, with extra large friction contact surface, and is lined with specially treated and fitted asbestos friction. In case of wear these asbestos frictions can be replaced easily. The design and material used on the frictions is such that free sliding is obtained the moment the operating lever is released.

To operate these frictions, an easy end thrust ball bearing operating device is used. The end-thrust bearings not only make it easy to operate, but also reduce the power for hoisting to a minimum.

Some of the main features of this new hoist, according to its manufacturer, are: heavy-duty engine equipped with magneto automatic governors, air cleaner and reduction gears running in oil; the two back-drums run in same direction easy for watching hoisting rope from top; extra large asbestos equipped brakes for lowering loads; boom swinger simple, strong, compact and efficient; extra heavy steel-forged ratchet pawls for holding loads; end thrust screw-operating device equipped with end-thrust ball bearings.

News of All the Industry

Incorporations

Fresh Water Sand Co., Seattle, Wash., has been incorporated for $20,000 by Louis A. Hill and Elizabeth M. Hill.

Waterseal Roofing Tile Co., Austin, Texas, has been incorporated for $10,000 by C. H. Page, L. C. Page and D. G. Hewlett.

World Utilities Corp. has been incorporated in Wilmington, Del., for $1,000,000 to own and operate quarries, brick yards, etc.

Rock Hill Quarry and Material Co., St. Louis, Mo., has been incorporated for $100,000 by H. E. Billman, John Cox and others.

Palm Beach Concrete Co., West Palm Beach, Fla., has been incorporated with Virgil D. Chandler as president and Sarah B. Baker as secretary.

Grundy Ventilated Block Co., Little River, Fla., has been incorporated for $10,000. Edward F. Grundy, president; Howard R. Grundy, secretary.

Liberty Lake Gravel Co. has been incorporated under the laws of Delaware for $300,000. (Corporation Trust Co. of America, Wilmington, Del.)

Starr Mica Co., Heflin, Ala., has been incorporated for $10,000 to manufacture mica products. Incorporators: G. Cohn and John M. Zeeman, both of Heflin.

Acme Silica Sand Co., Massillon, Ohio, has been incorporated for $50,000 by W. R. Layne, H. G. Layne, Jerome F. Welch, Reuben Carman and D. L. Wolgamott.

Mountain View Gravel Co., Enid, Okla., has been incorporated for $50,000 by Warren I. Watkins, Roderick A. McDonald and Mary E. Watkins, all of Enid.

Standard Portland Cement Co., Moundsville, W. Va., has been granted a charter to carry on a manufacturing business in Marshall and other counties in the state.

McCrillis Stone Meal Corp., Boston, Mass., has been incorporated for $400,000. President, William N. McCrillis; treasurer, Harry B. Bowl, 89 State street, Somerville, Mass.

Springfield Washed Gravel Co., Springfield, Ohio, has been incorporated for $40,000 and will equip a gravel plant on Buck Creek, near Springfield. George L. Ohmart is president.

Roanoke Concrete Pipe Co., Roanoke, Va., has been incorporated for $100,000 to manufacture concrete pipe and other cast cement products. President, G. D. Shipplett; secretary, C. F. Cooke.

Richmond Sand and Gravel Co., Norfolk, Va., has been incorporated for $150,000 and will develop sand and gravel deposits in Chesterfield county, Virginia. C. C. Colmus, Jr., is president.

Alder Creek Cement Products Co., Forestport, Oneida county, New York, has been incorporated for $50,000 by J. Band, A. M. Gantner and J. G. Hoffman. Attorney, C. A. Thompson, Old Forge, N. Y.

Mountain State Cement Corp., Beckley, W. Va., has been incorporated for 2500 shares without par value by W. H. File, Ben H. Ashworth, D. D. Ashworth, A. D. Preston and C. H. Meador, all of Beckley.

Seaboard Feldspar Co., Equitable Bldg., Baltimore, Md., has been incorporated to operate a mining and grinding plant for feldspar production. Incorporators: Joseph P. Rodgers, Gottlieb Stengel and Clarendon I. T. Gould.

Addison Rock Products Corp., New York City, has been incorporated for $250,000 by William Rockwell, 1625 Atfield avenue, Jamaica, N. Y., to quarry marble, granite, etc. Attorney, R. Rutherford, 38 Park Row, New York City.

Peerless Sand Cement Brick Co., York, Penn., has been incorporated for $200,000 and will begin the erection of a new plant to cost about $45,000 with machinery. M. L. Strayer, president, and J. W. Neuman, treasurer, both of York.

Hedrick & Wade, Lilesville, N. C., dealers in gravel, building stone, rock, sand, clay, minerals and metals of all kinds, has been incorporated for $250,000 by B. V. and Daisy H. Hedrick of Salisbury and E. E. and Iona Wade of Fayetteville.

Halleck & Hill Gravel Co., Bloomfield, Mo., has been incorporated for $200,000 to mine and sell gravel and other material for road building purposes. Incorporators: H. H. Halleck of Cape Girardeau, C. G. Hill and C. M. Edwards of Malden and E. C. McConnell of Bloomfield.

Mineral Products Corp., Jersey City, N. J., has been incorporated to mine and compound mineral specialties. Incorporators: Sidney H. Anderson, William E. Reuter and John F. Hurley, 999 Bergen avenue, Jersey City, the last-named being representative.

Garrett Gravel and Cement Products Co., Garrett, Ind., has been incorporated for $15,000 to manufacture and deal in cement products, screen and wash gravel, etc. Incorporators: Walter, Laura B. and Roscoe R. Snithen, and Monte L. Green and W. W. Sharpless.

Nature's Mineral Products Co., Hot Springs, Ark., has been incorporated for $100,000 to mine and compound mineral specialties for fertilizer and other purposes. Incorporators: W. F. McCormick and W. H. Harry, Citizens National Bank Bldg., Hot Springs, the latter being secretary and representative.

Spokane Plastic Magnesite Co., Terminal Bldg., Spokane, Wash., has been incorporated for $200,000 and will start operations immediately. The new corporation has absorbed the Hawkeye Feltstone Co. and will continue along the same line as the Hawkeye company, but on a larger scale. The plant and buildings with a railroad spur track are at Mead, Wash. The magnesite stock will be obtained from the Northwest Magnesite Co. at Chewelah. The new concern will manufacture plastic magnesite for use in stucco work, flooring and other building purposes. The organizers and trustees of the company include: W. G. Ramage, secretary-treasurer of the Hawkeye Fuel Co.; J. S. Ramage, president of the Hawkeye Fuel Co., and R. K. Neill, president of the International Portland Cement Co.

Sand and Gravel

Marquette Road Gravel Co., Marquette, Kan., is completing the installation of tracks which will accommodate an output of 30 cars of gravel a day.

Shepherd Sand and Gravel Co., Shepherd, Texas, filed a voluntary petition of bankruptcy recently in the office of the federal clerk. C. E. Barry is president and general manager.

Moorac Sand Co., Junction City, Ga., has inquiries out for a cableway and buckets, hoisting equipment, gasoline engine, and other apparatus. C. W. Moore is president.

Waverly Gravel and Tile Co., Waverly, Iowa, moved its offices recently from the basement of the Waverly Savings bank to the rooms over the Lindblom jewelry store, formerly occupied by Pixley Smith, city engineer.

Monterey Sand and Gravel Co., Monterey, Calif., a new concern whose notice of incorporation was published in Rock Products for June 14, has for its directors: H. D. Severance, J. J. Harris, C. H. Siddall, J. P. Pryor and C. M. Collins.

Howell Gravel Co., La Grange, Mo., of which W. F. Howell is manager, began operations recently. The company has a standing order with the railroad for 20 cars a day, and it is expected to increase the number later and work three shifts of men. The gravel taken out is for state road work and will be shipped to all parts of Missouri.

Le Mars Sand and Gravel Co., Le Mars, Iowa, recently had its receivership terminated, and the First Mortgage Co. of Des Moines has been given the deed and title to the plant. The name has been changed to the **Hawarden Gravel Co.** J. P. Burington, who acted as receiver for the sand and gravel company, has been retained as manager.

Corunna, Mich.—The county road commission has just purchased the Michigan Central railroad gravel pit in Owosso township for $3150. The pit is located about three miles south of Owosso on the town line and covers seven acres, which, according to road commissioners, contains enough gravel to last for many years.

Chillicothe, Mo.—The state highway department has recently closed a contract with Johnson & Hudson, Carrollton, Mo., for the production of road surfacing gravel from a large pit recently located near the Wabash railroad, west of Chillicothe. The opening of this gravel pit will enable the department to lower materially the cost of construction of roads in northern Missouri.

W. A. Arington and **W. H. Putnam** of Modesto, Calif., have leased from the Santa Fe railroad 20 acres of land just north of the Santa Fe railroad bridge at the edge of the town of Riverbank and have teams at work grading and making ready for the opening of a sand pit. The pit is not far from that operated by the **Riverbank Sand Co.** The office of the company will be established in Escalon.

Tecumseh, Mich.—One of Tecumseh's most important industries, that of producing gravel, is in store for further expansion of machinery which will increase the capacity of local pits, a survey of gravel companies here shows. The **Tecumseh Gravel Co.**, the **Lenawee Sand and Gravel Co.**, the **Detroit, Toledo & Ironton Railroad** pit and the Puritan Sand and Gravel Co. have a combined investment of approximately $325,000 and total capacity of 80 cars, or about 2800 tons daily. The **Tecumseh Gravel Co.** is the oldest plant here, having been managed by W. F. Fisher since its inception 30 years ago. The pit has a capacity of 40 carloads a day. The officers are: President, R. F. Harper; vice-president, F. B. Wood; secretary, C. B. Hancock; treasurer and manager, W. F. Fisher. The **Lenawee Sand and Gravel Co.** was established this year on a production basis. Its equipment is said to be valued at $82,000 and it is capitalized at $125,000. Its capacity is 10 cars daily. The officers are: Sam J. Wilson, president; Amos Kells, vice-president; Ira Ashley, secretary and treasurer. The outstanding feature of this pit is its modern design. It is stated that the only other pit like it in the United States is one owned by the Illinois Central railroad, located at Forreston, Ill. Both the local and the Illinois Central plant were designed by W. H. K. Bennett, gravel construction engineer of Chicago. **Puritan Sand and Gravel Co.** reports its capacity as 12 carloads, eight of gravel and four of sand. Its equipment includes a New York Central siding, a belt conveyor, washer and drag line. Frank Sutton is manager. The **Ford pit**, the newest producing plant here, has a capacity of 20 carloads daily. A Marion steam shovel is used for excavation. The output is used along the D., T. & I. tracks.

Quarries

Badger Stone Co., Mountain City, Wis., has been awarded a contract to furnish 15,000 cu. yd. of rock for river improvement work.

Lynchburg Stone Co., Lynchburg, Va., of which W. H. Loyd is secretary, is installing about $10,000 worth of machinery and plans a daily output of about 200 tons.

White River Marble Co., Cartney, Mo., is installing more machinery for handling its products. A big derrick has been installed at the quarry for handling the stone, and one on a side track for loading the stone on the cars.

Monmouth Stone Co., Gladstone, Ill., has informed its stockholders that a petition has been filed in the federal court in Peoria asking that a date be set for the sale of the plant at Gladstone, according to reports.

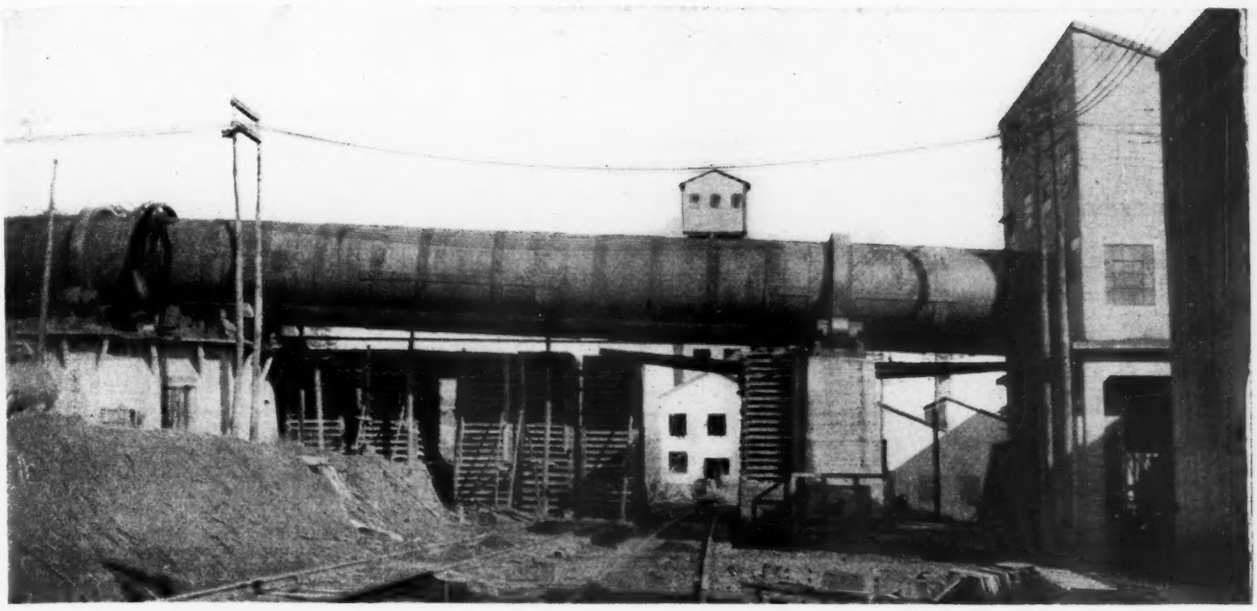
Strange & McGuire, Canon City, Colo., paving contractors, are constructing a new rock crushing and bithulitic mixing plant near the Denver & Rio Grande Western tracks on South First street. It is stated that 175 cu. yd. of rock will be crushed a day.

France Stone Co., New Paris, Ohio, recently closed its quarries indefinitely, throwing out of employment 30 men. The quarry is an old industry and in recent years has maintained a payroll of around $75,000 a year. A large stock of crushed stone in storage and a lack of orders for immediate shipment were the reasons assigned for the shutdown, it is stated.

Foster & Creighton Co., Nashville, Tenn., will operate a quarry at Rockwood Tenn., where it has a deposit of oolitic stone. This will be known as the Aday Quarry and it is reported to have a capacity of 10,000,000 cu. ft. It is said that the opening of this quarry will enable the people of Nashville to get this building stone at a reasonable price and on quick delivery.

Kiggins Quarry Products Co., Hillsboro, Ill., at its annual election of officers held recently elected the following directors for the coming year: President and general manager, M. T. Kiggins; vice-president and superintendent, Geo. Gruhl, Sr.; secretary, A. H. Bartlett, and treasurer, Alden Snyder. All the improvements started this spring are completed and the quarry is working full time with a force of about 25 men.

Brownwood, Texas.—The new rock crushing plant of the Atchison, Topeka & Santa Fe rail-



Allis-Chalmers Equipment

at the SIGNAL MOUNTAIN PLANT

This equipment consists of Kilns, Coolers, Compeb Mills, Motors, Dryers, Centrifugal Pumps and the Slurry equipment.

Allis-Chalmers equipment, as installed in this and many other leading plants, is the result of a thorough study of departmentally interrelated engineering problems and their successful solution by an organization which has unexcelled facilities and whose products include nearly the whole field of engineering practice.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

When writing advertisers, please mention ROCK PRODUCTS

road, which was erected at a cost of $300,000, is now in operation crushing 2500 cu. yd. of rock daily, the material being used to ballast the roadbed of the system in Texas. The company has taken a 90-year lease on Hall mountain, embracing a rock deposit of more than 200 acres, from which the rock crusher will draw its supply of material.

Gypsum

U. S. Gypsum Co., Chicago, Ill., is reported to be making a survey of the gypsum deposits near Blythe, Calif., to be followed by extensive developments. The mountains bordering the Palo Verde valley are rich in gypsum deposits, it is understood, and it is stated that this company has 10,000,000 tons of the mineral in sight.

Cement

Manitowoc Portland Cement Co., Manitowoc, Wis., recently entertained members of the Kiwanis Club on an inspection trip through its new plant.

Oro Grande Cement Co., Los Angeles, Calif., has engaged A. L. Acker, 445 Douglas building, architect, to prepare plans for a new mixing plant in the Beverly Hills district, one-story, 40x100 ft.

Signal Mountain Portland Cement Co., Chattanooga, Tenn., held its quarterly meeting of directors recently at which the following officials were present: John L. Senior of Chicago, president; F. A. Stephenson of Mason City, Iowa; Charles Closz of Webster City, Iowa, and R. G. Wright of Knoxville, Tenn.

Trinity Portland Cement Co., Dallas, Texas, has its new plant at Ft. Worth now under construction. According to reports, power and machine shop buildings have been finished. The larger building, to house the kilns, will measure 75x360 ft. and a second structure of virtually the same dimensions will be erected to house the crusher. Shipments of machinery are now under way and it is expected the plant will be in operation by January.

Louisville Cement Co., Louisville, Ky., will resist attempts of the State Board of Tax Commissioners to increase its assessment of $2,300,000, it is reported. The company owns extensive farm and cement rock properties in Clark county and operates a large cement manufacturing plant at Speed, Ind. The company's real estate is already assessed at $1,000,000 and its personal property at $700,000. The board wishes to add $600,000 to the personal property valuation, it is stated.

Virginia Portland Cement Co., National Bank of Commerce Bldg., Norfolk, Va., is perfecting plans for the construction of a new local mill, consisting of a number of buildings, with power house, estimated to cost in excess of $1,000,000. It is said that work will be started before the close of the month. The company has a tract of property for raw material supply in the immediate vicinity, on the James river, and will also install equipment here. The International Cement Corp., 342 Madison avenue, New York, operates the company.

Concrete Products

Butlerville Cement Products Co., Butlerville, Ind., has filed a preliminary certificate of dissolution.

Cement Products Co., Wilmington, N. C., has increased its capital stock from $125,000 to $250,000.

Davenport Duntile Works, 613 Harrison street, Davenport, Iowa, is the name of a company headed by Grover Donald to manufacture building tile.

Wm. M. Mahaffy, Hot Springs, S. D., has purchased and will operate a cement products plant in Rapid City, S. D., making building blocks and other concrete units.

Alfred Lingensjo, 711 East Sixth street, Burbank, Calif., is planning the manufacture of a cement block which is reinforced with steel rods and constructed on the continuous air space plan.

Yakima Cement Products Co., 611 N. Front street, Yakima, Wash., is planning the enlargement of its plant to cost about $1000. A small steam kiln will be built and a storage room added.

Pacific Concrete Products Co., Oakland, Calif., has begun operations in its new plant at the foot of 48th avenue. The company is making a new type of concrete block with various color effects, to be used for facing buildings, etc.

Sun Paint Pigment Co., Knoxville, Tenn., recently organized with a capital of $150,000, will erect a new plant at Sparta for the production of paint pigments. It is purposed to install electrically operated equipment. Oliver W. Hill, 520 West Church street, is one of the heads of the company.

Lime

Los Angeles Lime Co., Los Angeles, Calif., is about to begin erection of an office and work room at 180 East 16th street to cost about $1000.

Cornwell Lime and Marl Co., Winchester, Va., has acquired a 10-acre marl pit in Jefferson county and will operate soon. W. B. Cornwell heads the company.

Phosphate Rock

Planters Lime and Phosphate and Fertilizer Co., Little Rock, Ark., recently filed a certificate of dissolution in the office of H. B. Chrisp, county clerk, showing that the company has ceased business in the state. It was signed by J. R. Alexander, president.

Talc

Pyro Talc Co., Glendon, N. C., recently formed by Charles P. King, 43 Tremont street, Boston, Mass., and associates, with capital of $250,000, has acquired the local property and plant of the W. E. Paschal interests, consisting of about 150 acres of land and reduction mill. The present plant has a capacity of about 300 tons a week, and it is expected to advance this output soon. Mr. King is president and Henry W. Whitaker, 104 Ward street, Newton Center, Mass., is treasurer. An incorporation notice appeared in Rock Products for July 12.

Personals

M. J. Johnsson, formerly with the Clarke Rock and Gravel Co., Los Angeles, Calif., is now superintendent of the plant of the Pacific Portland Cement Co. at Cement, Calif.

Paul Sunderland, son of L. T. Sunderland, president of the Ash Grove Lime and Portland Cement Co., has been appointed to succeed W. H. Barton as local superintendent with offices at Springfield, Mo.

John Rice, president of the General Crushed Stone Co., and **R. S. Gerstell**, secretary of the Alpha Portland Cement Co., were elected, with others, directors of a company recently formed to construct a hotel at Easton to cost approximately $1,125,000.

F. H. Gades, for 22 years manager of the stationery and office equipment department of Crane & Co., has purchased a large block of stock in the Wear Sand Co. of Topeka, Kan., and is now in full management of the company.

Vernon Lemasters of Iola, Kan., has been made treasurer and vice-secretary of the Cuban Portland Cement Co., with whom he has been employed for a number of years. Before his promotion, Mr. Lemasters was vice-treasurer of the company.

A. C. Withrow, who has been in ill health for some time, has sold his interests in the C. O. Mitchell & Co. Marble Works, Bentonville, Ark., to Charles W. Foster. Mr. Foster will act as salesman and Mr. Mitchell will look after the business end of the firm.

George W. Patnoe, an official of the American Lime and Stone Co., Bellefonte, Penn., who resides at the Brockerhoff hotel, met with an accident recently which fractured his right leg. He cranked his car while in gear and got between the car and a building.

O. L. Swanzey, president of the Missouri Marble Quarries, Inc., St. Louis, Mo., was unanimously elected chairman of the Sales Managers' Bureau of the St. Louis Chamber of Commerce for the ensuing year at a meeting of the board of that organization held recently.

Manufacturers

Industrial Works, Bay City, Mich., announce the opening of a new district office at 455 Monadnock Bldg., San Francisco, Calif., in charge of J. M. McGuire, who has been with the company for 20 years as construction and erecting engineer. His long experience especially fits him for service in connection with locomotive crane sales and installations.

Pennsylvania Pump and Compressor Co., Easton, Penn., announces that the Kilner-Mills Co., General Motors building, Detroit, Mich., is its representative for the state of Michigan and northwestern section of Ohio. This company's long experience particularly fits it to handle and help solve industrial problems involving the application of compressed air service. The products offered by the Kilner-Mills Co. are air compressors, in both single and double stage types, and include direct-connected gasoline-driven portable compressors. The pumps handled are the centrifugal double-suction single-stage, multi-stage and a portable known as the Penway pumper.

Trade Literature

Osgood Co., Marion, Ohio. Circular illustrating the ¾-yd. heavy-duty revolving excavators, including a table of ordinary working ranges for both clamshell and dragline.

Universal Crusher Co., Cedar Rapids, Iowa. Folder 124-M describing and illustrating the varied lines of crushing equipment manufactured by this company, such as jaw crushers, pulverizers, elevators, screens, and auxiliary equipment.

McDermott Bros. Co., Allentown, Penn. Circular illustrating and describing the direct-heat rotary dryer and the steam-heated air dryer of this company's manufacture. The company is in a position to make tanks, steel bins, stacks or steel plate work also, it announces.

Jeffrey Manufacturing Co., Columbus, Ohio. Catalog 397, a nicely bound book containing 88 pages including an index. The book describes equipment for cement, stone and allied industries, and has numerous illustrations and many tables of sizes and specifications.

Denver Rock Drill Manufacturing Co., Denver, Colo. Circular entitled "Waughammer Twins." These are lightweight drills for quarry work, etc., and there are two models; namely 95, a dry machine for general service; and 93, which can be used either wet or dry, and can be equipped with a constant blowing device for deep drilling in limestone quarries.

Milwaukee Locomotive Mfg. Co., Milwaukee, Wis. Bulletin 136 on the Type H gasoline locomotives of this companys manufacture, describing in detail and illustrating Type H9 nine-ton; Type H10 ten-ton, and Type H15 fifteen-ton gasoline locomotives. This is a well-prepared booklet containing a number of excellent halftones and including condensed specification tables.

New York Belting and Packing Co., 91 Chambers street, New York City. General catalog containing useful and valuable information on mechanical rubber goods, describing the different lines of belting and other goods manufactured by this company. The book is bound in an attractive cover, contains 221 pages, including an index for ready reference, is printed on coated stock and is profusely illustrated with excellent halftone engravings.

American Manganese Steel Co., 398 East 14th street, Chicago Heights, Ill., has recently issued three catalogs Nos. 1, 3 and 5 on "Amsco" manganese steel castings for quarries, for contractors and for mines, respectively. These catalogs are in looseleaf form, bound in an attractive cover. They describe fully the various uses of manganese steel castings both in the making and in service, and numerous halftone and line engravings are included, besides tables of specifications.

Superheater Co., 17 East 42nd street, New York City. Booklet, "Origin. Development, Results of 'Elesco,'" giving briefly the history and the growth of the operations of the Superheater Co., manufacturer of superheaters for every type of steam boiler in locomotive, marine, and stationary services. An interesting paragraph is the one that explains the origin of the trade name "Elesco" applied to the products of the company. A copy of this book will be sent to anyone mentioning Rock Products.

Pawling & Harnischfeger Co., Milwaukee, Wis. Bulletin 600-X describing in detail the Model 200 excavator manufactured by this company. This is a general-purpose machine which, by changing booms and rigging, can be used interchangeably as shovel, dragline, clamshell crane, skimmer scoop, pile driver, backfiller, hook crane, and magnet crane. Several halftone and line illustrations are included, and tables of working dimensions are given. Much thought and care have been given to the preparation of this bulletin, as is evidenced by the make-up and printing.